



**ROOTMAKER®**  
PRODUCTS COMPANY

newsletter

SUMMER 2003

### RootMaker® News

The increased number of RootMaker® users has been incredible this spring. In addition, we have had a number of nurseries sign up to be certified growers. The program is continuing to grow.

Many users of the RootTrapper® SoftSided containers have stated that these containers represent the next generation of nursery containers. The benefits of using these containers range from reduced water use to increased growth due to cooler root zone to ease of shipping. These are all great indicators that the RootTrapper® containers are on the leading edge of container design and function.

We have expanded the RootTrapper® SoftSided container line to include inserts for nurseries that employ PIP production methods. The RootTrapper®-In-Pot (RTIP) will provide the same benefits of constant root pruning and reduced water usage as when used above ground. The added benefit will be when the plant is taken out of the socket pot and staged above ground – the white RootTrapper® material will prevent the burning of the root tips at the edge of the container when exposed to the sun for the first time. The RTIP container inserts are special order as there are a number of different size socket pots in use.

The FC5 Knit Fabric container has been in great demand this spring. It is proving to be a very creative way to produce quality liners in a short time. The FCR5 (RootTrapper®) is beginning to draw attention as well. Studies by Dr. Whitcomb have determined that there is no measurable difference in plant response between FC5 (Knit Fabric container) and FCR5 (RootTrapper® container).

Another exciting development is the redesign of RootBuilder®, which began last summer. The redesigned material will have several improvements over the original. We have increased the effectiveness of air-root-pruning, increased the number of holes per square foot, eliminated the flair at the top of the container, and generally made the product better in appearance. We

will have the RootBuilder® II in stock as soon as possible. We will ship the new RootBuilder® as the material becomes available. Until then, we can ship the original design within a day or two of your order.

We have decided to leave the additional discount in effect for the foreseeable future on large purchase of the RMII-18 Cell and RMII-32 Cell trays. The discount will be 15% for order of 6,000 to 12,000 trays and 20% for order over 12,000 trays. (FOB Ship Point) The discount applies to the total number whether buying one or both trays.

It is just about time for the summer show season. We hope that all our customers come by to visit. We will have all the new products on display. Booths will be in the following trade shows this summer and fall. The Farwest Show and MTNA trade show have been added to the schedule. Gay and I will be at all of the shows. Dr. Whitcomb will be at SNA and the Nursery/Landscape Expo in Dallas. We hope to you there.

### Show Schedule

PANTS, Ft. Washington, PA, Jul 28 - 31 Booth # 2620  
SNA, Atlanta, GA, Jul 31 – Aug 2, Booth # 403  
The Nursery/Landscape Expo, Dallas, TX, Aug 16-19,  
Booth # 918  
Farwest Show, Portland, OR, Aug 22-24, Booth #12053  
FNATS, Orlando, FL, Sep 19-21, Booth # 776  
MTNA, McMinnville, TN, Oct 2 - 3  
Great Southern Tree Conference, Gainesville, FL,  
Dec 5-6

Additional information about the trade shows can be found through our web site, [www.rootmaker.com](http://www.rootmaker.com). We also have links to most of the shows above.

There is a correction from the Winter 2003 Newsletter. The new RMII-1S 1-gallon container is not available because of problems in manufacturing. We are making every effort to have it available as soon as possible.

## Grower Tips

Proper planting depth is an issue that has been recently addressed by ANLA. The ANLA Horticultural Standards Committee has decided that loose soil above the root collar will not be recognized as part of the root ball. This is a change to the American Standard for Nursery Stock specification ANSI Z60.1.

If you are in need of some way to keep large container trees from blowing over, there are two companies that offer devices that can help. T-Mate-O also has a line of products for mechanically moving the RootTrapper® containers.

- 1) TSS Inc.  
PO Box 1809  
Ruskin, FL 33575  
Phone (813) 645-9527  
Email [treesupportsys@aol.com](mailto:treesupportsys@aol.com).
- 2) T-Mate-O, LLC  
6921 Stacy Road  
Charlestown, IN 47111-9626  
Phone (877) 854-5496  
Web site [www.tmateo.com](http://www.tmateo.com)

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## Lacebark News

Two new crapemyrtle cultivars (with plant patents pending) have been named and released to licensed growers;

1. Burgundy Cotton® (ID code, G-15-1A) has red-wine foliage and white flowers in large clusters and grows vigorously to a height of 12 to 15 feet or more.
2. Siren Red® (ID code E-8-99) has wine new growth that quickly changes to dark green and flowers Oxblood Red (the color of dried blood) and grows at a moderate pace to a height of 6 to 8 feet. Both trademarks have been approved and are appropriate to use.

Propagation will begin soon of five seedlings from the 2002 plantings (nearly 11,000 plants were planted last July). All five seedlings have wine new growth, flower buds that are crimson (like small red Christmas tree ornaments), and pure white flowers that are completely sterile. These plants form new flower buds on the same stalk where old flowers just fell – strange but true. These plants may be the best yet in terms of continuous flowering and foliage, flower bud and flower color contrast. There is a high likelihood that the best performer of these five will be patented and named at some point.

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## Questions and Answers

1. Is drip irrigation or spray stakes a practical alternative to overhead irrigation for 1 and 3 gallon containers?

Answer: For 1 and 3 gallon containers there is no practical alternative to overhead sprinklers. Yes they waste a lot of water, but the cost and complication of using spray stakes, etc. is not the answer. Drip emitters over the top of 1 gallon doesn't work, mostly because of the expansion and contraction of the poly lines and not getting the water where it is needed.

2. What would be the best way to handle trees grown in Knit Fabric containers when they are harvested?

Answer: I suggest that harvested trees in Knit Fabric containers be placed above ground and NOT mulch them in. The main reason mulching is done is to keep B&B trees from blowing over and to aid the tree since 95% or more of the roots were lost in harvesting. If you place the trees grown in knit bags above ground, the flat bottoms helps them stand erect and if you do not mulch you get air-root-pruning around the outside. Once above ground, and when not mulched in, with the first flush of growth the tree will produce another cycle of root branching within the root ball, those will be air-pruned.

The primary reason for moving trees grown in knit bags into container is appearance and ease of handling. Once trees are harvested and placed above ground in knit bags they are ugly. When placed in RootBuilder® or RootTrapper® SoftSided containers, the trees look great, especially in the white RootTrapper® containers and are available to sell all summer.

3. Will RootSkirts® restrict airflow and increase humidity around the outside surface of RootMaker® container and interfere with air-root-pruning?

Answer: With good watering practices, NO. Research with a number of species has not shown this to a problem with good water management. However, if you over water continually and have water exiting drain holes after each irrigation, air-root-pruning would be reduced. However, once plants are removed from such a humid environment, any roots outside the container wall will be dehydrated and will not be a problem.

4. What is the minimum spacing for 10 to 24 inch Knit Fabric Containers?

Answer: For Knit Fabric, in-ground, containers the spacing should be roughly 4 foot centers for nearly all species. Consider the growth and development of trees

in 12 or 14 inch containers versus 18 inch. Trees in 12 or 14 inch containers will typically be harvested when the stem diameter is about 2 inches, whereas with the 18 inch container the trees will be harvested when the stem diameter is 2.5 to 3.0 inches. The lower branches that develop on the trees will be the same up to the point where all of the trees have stems about 2 inches diameter. For the trees in the 18 inch diameter containers that are going to be grown to a larger size (one more growing season) the removal of the lower limbs should begin at this point. As the longer lower branches are removed, the branches at a point roughly 4 feet above the ground are not as long and therefore can be left to grow another growing season without appreciable interference with each other.

On the other hand, if 24 inch diameter Knit Fabric containers are used, the spacing should be about 5 to 6 feet on centers to allow for the branch development on a tree of 3.5 to 4.0 inch stem diameter. As for spacing between rows, 10 feet is very workable for most species. The only reason to use rows wider would be if your machinery were of a larger size. Spacing trees 4 feet in the row and 10 feet between rows provides approximately 1000 trees per acre. Remember that most plants have developed methods that allow leaves on the inner branches to function similarly to those in full sun. There are only a few species that are particularly sensitive to shading by an adjacent plant, those are primarily the pines, and other conifers and particularly bald cypress.

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### **The Silent Explosion**

Carl Whitcomb Ph.D.

Lacebark Inc. Stillwater, OK 74075

#### **Energy Production**

Absorption of water and Nutrients by roots occurs mostly at the root tips and in the very young tissues just back from the tips. Water and nutrients are transferred to leaves via xylem tissues in the inner portion of roots and stems. Only when leaves have sufficient water and nutrients are they able to combine energy from the sun in with carbon dioxide and water to manufacture various sugars. These sugars are the energy source on which all living cells in the plant are dependent. When leaves manufacture more energy than they need, the 'extra' is redistributed via living phloem tissues, first to any flowers and developing fruit, then to stem tissues and finally to support further root growth.

#### **Increasing Energy Output**

About 1850 Lebig published his 'Law of the Minimum'. The essence of the Law was that plant growth will be restricted by the essential element most deficient. Lebig was right, and research for the last 150 years has focused on ways to remove the deficient element. My research with micronutrients in container growth media clearly confirmed Lebig's Law. When copper was applied, copper deficiency symptoms would disappear, but the symptoms of the next deficient element would appear. If that element was applied, deficient symptoms would disappear, but another deficiency would appear. After much frustration, I conducted a study with 243 treatments (three levels each of five micronutrient elements in all combinations), solved the perpetual problem and defined the optimum level of each of the five elements. The result of this research was Micromax® micronutrients, first manufactured and marketed in 1980 by Sierra Chemical Company, currently sold globally by Scotts Company.

Other Research focused on sources of nitrogen and other elements and ways to slowly release these elements.

Slow release fertilizers work and are in broad use in greenhouse and container nurseries around the world. As research continued, focus shifted to other factors that can sometimes be limiting such as increased CO<sub>2</sub> in greenhouses, more uniform water delivery, increased light and changes in the light spectrum in greenhouses and more.

#### **The Law of Minimum, Part II**

With plants grown in containers the factor currently most limiting growth is the root system. With a modest production of roots and most roots concentrated against the sidewall of smooth plastic containers, nutrient absorption is the limiting factor. With some woody plants it is estimated that as much as 88% of the active root tips are pressed against the sidewall of the container (Whitcomb, unpublished data). Most herbaceous and perennial plants have a more fibrous root system and explore more of the growth medium for nutrients but typically 60 to 80% of their active root tips are pressed against the sidewall. In order to fully utilize the volume of growth medium in the container as well as the water and nutrients held, a more fibrous root system is needed.

#### **The Silent Explosion**

Roots can be forced to branch. If roots are pruned at the appropriate time and in an appropriate way, secondary and tertiary branch roots can be produced in profusion. As root branching increases, absorption of water and nutrients and support for the top increases as does total energy output to the leaves. At the present time there are six ways to stimulate roots to branch beyond the natural tendency of the species:

- Air-root-pruning (RootMaker® containers)
- Root-tip-trapping (RootTrapper® containers)
- Constriction pruning (Knit Fabric containers)
  
- Root death by copper toxicity (Spinout® treated containers.
- Root death by suffocation (Rigsby and Lirio's water reservoir containers)

- Root tip removal by manual pruning or undercutting.

The most benign, yet most effective, ways to stimulate root branching are air-root-pruning, root-tip-pruning, and constriction pruning. Each technique has practical application but there are distinct differences. When used timely, wisely, and appropriately these three techniques can cause an explosion of new roots.

#### **Air-root-pruning**

Air-root-pruning occurs when an actively growing root tip is guided into an opening, exposed to dry air, shrivels and dies. The pruning effect is immediate. On some species, secondary branch roots can be seen within 24 hours. Secondary roots typically are produced roughly four inches back from the point of pruning. This improved root distribution improves utilization of the water and nutrients in the growth medium. In addition to stimulating root branching, the dry, shriveled root tip is not vulnerable to colonization by pathogens. But as the name implies, air-root-pruning requires exposing root tips to air, which is not always possible. For example, air-root-pruning does not work in pot-in-pot or field production.

#### **Root-tip-trapping**

Root-tip-trapping occurs when an actively growing root tip is trapped and held and can no longer extend. In order for a primary root tip to maintain control and suppress secondary root formation it must continue to extend. When a root tip can no longer extend, it slowly loses dominance and secondary roots form. From the time a root tip is first held until secondary roots can be seen ranges from 3 to 10 days or more, depending on the species, time of year and other environmental conditions. I invented the first root-tip-trapping container in 1983. The concept worked. The limitation was the number of root-tip-trapping points. When all 120 root-tip-trapping recesses were full, additional roots could circle. The RootTrapper® SoftSided container is made of a laminated fabric. When root tips contact the fabric, they are trapped. The laminated coating on the outside of the fabric stops roots from growing through. Because the entire inner surface of the container consists of fabric capable of trapping root tips, over 100 root tips can be trapped per square inch. Root-tip-trapping can be accomplished in containers above ground or in the ground in pot-in-pot.

#### **Constriction Pruning**

Constriction pruning dates back to a chance observation I made in 1967. Roots of trees had been placed through

holes in the sides of adjacent containers as a way of studying root response to grass competition. When roots were snug in the hole the response was different compared to when roots fit loosely in the hole. Refining this root response to the fullest, it was found that when root tips of 12 different woody trees were given the opportunity to grow through holes 4/64-inch in diameter, none did. But when the holes were 5/64-inch in diameter, all did. As soon as the root increased in diameter only slightly, energy from the leaves was blocked in the outer phloem sheath and after a period of 10 to 30 days or more, most species produced secondary branch roots. If the holes were made larger than 5/64-inch, constriction was slower to occur and production of secondary roots decreased. Fabric, in-ground, containers made of knit fabric with each opening precisely 5/64-inch in diameter stimulate root branching of plants grown in field soil, promote formation of root buds, and accumulated energy. Following fabric removal and transplanting, huge numbers of new roots are produced.

There are three methods of root pruning that are not recommended;

**Root Death by Copper Toxicity.** Root tips can be killed by toxic levels of copper, boron or zinc painted onto the inside of a plastic container. Following death of the root tip, secondary branch roots do form on some species. These secondary roots extend out and are also killed by copper toxicity. This technique carries lots of undesirable baggage.

**Root Death by Suffocation.** Suffocation occurs any time water is in excess and roots are deprived of oxygen for an extended period of time. In 1991, Robert Rigsby patented a container that maintained a reservoir of water in the bottom to suffocate roots. The species that tolerate these conditions do produce some additional root branching. In 2000, Lirio Corp. patented a container with a water reservoir in the bottom for root suffocation pruning as a method to stop roots from escaping from pot-in-pot.

**Root Tip Removal by Manual Pruning or Undercutting.** Root pruning in the field has been done or talked about for decades. Likewise, pruning of roots of plants either bareroot or in container grown at the time of transplanting typically stimulates some root branching. Three problems are notable: Loss of roots, labor required and open wounds prime for pathogen entrance.

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