Tree I.V. Micro-Infusion™ System

Training Manual

Revision Date: 1/25/08
# Table of Contents

<table>
<thead>
<tr>
<th>Subject Headings</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro: To Tree I.V. Micro-infusion™</td>
<td>3</td>
</tr>
<tr>
<td>Intro: Parts of the Tree I.V. Kit</td>
<td>4</td>
</tr>
<tr>
<td>Intro: 3 Easy Steps to the Tree I.V.</td>
<td>5</td>
</tr>
<tr>
<td>Set Up: How to Assemble the Tree I.V.</td>
<td>6</td>
</tr>
<tr>
<td>Set Up: Prepare the Tree I.V.</td>
<td>7</td>
</tr>
<tr>
<td>Set Up: Pressurize &amp; Prime Supply Lines</td>
<td>8</td>
</tr>
<tr>
<td>Set Up: Select Arborplug™ Sites</td>
<td>9</td>
</tr>
<tr>
<td>Procedure: Drill Sites for Arborplugs</td>
<td>10</td>
</tr>
<tr>
<td>Procedure: Set the Arborplugs</td>
<td>11</td>
</tr>
<tr>
<td>Procedure: Conifer vs. Deciduous</td>
<td>12</td>
</tr>
<tr>
<td>Procedure: Micro-infusion™ with the Tree I.V.</td>
<td>13</td>
</tr>
<tr>
<td>Procedure: Using Multiple Tree I.V.s</td>
<td>14</td>
</tr>
<tr>
<td>Procedure: Large Tree Micro-infusion™</td>
<td>15</td>
</tr>
<tr>
<td>Maintenance: Clean Out</td>
<td>16</td>
</tr>
<tr>
<td>Maintenance: General</td>
<td>17-18</td>
</tr>
<tr>
<td>Optional: STINGER Method for Tree I.V.</td>
<td>19-20</td>
</tr>
<tr>
<td>Ordering / Parts: Tree I.V. Replacement Parts</td>
<td>20-24</td>
</tr>
</tbody>
</table>
Introduction to Arborjet’s Tree I.V. Micro-infusion™

Arborjet’s Tree I.V. Micro-infusion™ system was developed to effectively deliver high volumes of injectable product into the sapwood of any type of tree. It enables the applicator to precisely deliver an accurate, measured dose of insecticide, fertilizer or fungicide into the xylem tissue in a safe and environmentally friendly way. The Tree I.V. utilizes either VIPER or STINGER micro-infusion interface technology.

VIPER - “Volume-Injection Pressure-Enhanced Reservoir” (uses Arborplug)
• Arborplug is the plug inserted into the Sapwood
• VIPER Needle is the name of the Micro-infusion™ Needle
• VIPER Method is the procedure for the Micro-infusion™ using Arborplug and VIPER needle.

STINGER – “Stick-Inject-Remove” (Does not use Arborplug)
• STINGER Needle is the name of the Micro-infusion™ needle and tip.
• STINGER Method is the procedure for the Micro-infusion™ using STINGER needle.

For customer assistance, call from 9 am to 5 pm EST Monday through Friday at 1-866-272-6758 or visit the website at www.arborjet.com. www.arborjet.com. We welcome your comments, questions and suggestions concerning Arborjet’s Tree I.V. and injectable products.
Parts of the Tree I.V. Kit (2-pack)

- Pressure Pump (010-7081)
- Bottle & Cap Assembly (010-9024)
- Tree I.V. Stands 010-1125
- Tree IV 2 pack Kit – 070-0010
- Deluxe Tree IV Kit – 070-0015
- 5 Gallon Bucket (975-00113)
- Funnel (975-00098)
- Graduated Cylinder (975-9040)
- Tree I.V. Manifold w/ 4 supply lines (010-7006)
- Tree I.V. Tool Kit (010-4018)

CLEAN-jet

$\frac{1}{2}$ L (030-2035)
Reorder:
1 L (030-2030)

Training Manual
3 Easy Steps for the Tree I.V.

1. DRILL
2. PLUG
3. INJECT

SAFETY REMINDER
Always wear safety glasses and gloves when handling equipment and products.

Tree I.V. in use
How to Assemble the Tree I.V.

To Remove:
Compress the plastic ring and pull tubing or needle.

* Insert needles and tubing firmly into quick disconnect fittings.
Prepare the Tree I.V. for Micro-infusion™

1. **Measure tree** diameter in inches, at chest (breast) height by using a diameter tape, or measure circumference and divide by 3. DBH” = Diameter at Breast Height in inches.

2. Use the **Product Label**, and DBH” to determine 3 things:
   - **a. Total injection volume**
     (ex. 16” tree @ 4mL/DBH” rate = 64mL total IMA-jet volume)
   - **b. # of Injection Sites Recommended**
   - **c. # of Tree I.V. Bottles to Use**

3. **Measure volume** in graduated cylinder.

4. **Pour** into Tree I.V. bottle(s) using funnel

!! IMPORTANT!! 600 ml capacity- There must be air space in the bottle for air pressure, otherwise you may need to re-pressurize during the micro-infusion.

---

**Table 1. Recommended # Tree I.V. and Arborplugs**

<table>
<thead>
<tr>
<th>Inches DBH</th>
<th># of Tree I.V. Bottles</th>
<th># of Arborplugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-14”</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>15-26”</td>
<td>2 *</td>
<td>6-8</td>
</tr>
<tr>
<td>27-38”</td>
<td>3 *</td>
<td>10-12</td>
</tr>
<tr>
<td>39-50”</td>
<td>4 *</td>
<td>14-16</td>
</tr>
<tr>
<td>51-62”</td>
<td>5 **</td>
<td>18-20</td>
</tr>
<tr>
<td>63-74”</td>
<td>6 **</td>
<td>22-24</td>
</tr>
</tbody>
</table>

* Or use Expansion Kit – 010-7016
** Or use 2 Tree I.V. bottle plus Expansion Kit

---

WARRANTY VOID WITH USE OF NON-ARBORJET APPROVED FORMULATIONS
Pressurize and Prime Supply Lines

1. Make sure Tree I.V. Top and Needle Valves are **OFF** before Pressurizing, then connect the Tree Pump.

2. **Pressurize** between 35 – 60 psi. For safety: Blow-off valve will release at 60psi (maximum).

3. Turn **ON** the Tree I.V. Top valve, and product will flow into the supply lines.

4. To prime the supply lines, open each Needle Valve to release any air in the lines. Product will fill the supply lines. This is recommended for best uptake results.

**NOTE**: Before you begin treating Conifers, please see pg 12 “Conifers vs Deciduous”
Select Arborplug™ Sites

No. of Arborplugs = DBH”/4 up to DBH”/2 (ex. 16” = 4 – 8 sites)

Sites are within 36” above the soil line.

The Best Arborplug Injection Zone

Root Flares show best uptake and formulation distribution to the canopy. Choosing good Arborplug sites result in faster injections.
Drill Sites for Arborplugs

- Use sharp, high-helix brad-point drill bits (included in kit).

- **For Beginners:**
  **Drilling in 2 Steps:**
  1. Use very light pressure to drill through outer bark and inner bark. The drill bit will stop at the Xylem. You can remove drill bit to note the bark thickness.
  2. Use quick heavy pressure to drill into the Xylem.

**Estimated Drill Depth into Xylem:**
- Hardwoods – 5/8” – 1 5/8” deep
- Conifers – 1 5/8” – 2” deep

**Drill Bit Sizes:**
- 9/32” for #3 Arborplugs
- 3/8” for #4 Arborplugs
Set the Arborplugs

1. Set Arborplugs into drilled holes using set tool (from kit) and hammer.

2. Make sure the barbs on the Arborplug make a seal between the xylem and the inner bark as illustrated.
Procedure: Conifers vs. Deciduous

**Important Note For Conifer Injections:**
Sap flows out of conifers as a protective response to drilling.
For best results, we recommend:

1. Pressurize Tree I.V. and prime each Needle Valve.
2. Drill and set 1 Arborplug
3. Insert 1 VIPER needle and turn on the Needle Valve.
4. Repeat steps 2 and 3 for each injection sites.

So insert VIPER needle and turn on valves right after each Arborplug is set.
If too much time has passed between Arborplug setting and micro-infusion, sap may flow into your injection site, and make your uptake slower.

**Important Note For Deciduous Injections:**
No sap flows from deciduous trees after drilling.
For best results, we recommend:

1. Pressurize Tree I.V. and prime each Needle Valve.
2. Drill and Set All Arborplugs.
3. Insert All Primed VIPER needles and turn on each Needle Valves.
4. Turn All Primed VIPER needles ON (same time)

Deciduous tree micro-infusion occurs very rapidly. You can open all VIPER needle valves then open the bottle top valve. This will ensure that even distribution of product occurs at each injection site.
Micro-infusion™ with the Tree I.V.

1. Turn bottle top valve ON (counter-clockwise).
2. Set VIPER Needle into the Arborplug.
3. Turn VIPER Needle valve ON (counter-clockwise).
   • Repeat for each needle.
4. Turn OFF each VIPER Needle as it finishes, and remove.

Caution!!
Do not leave Arborjet Tree I.V. unattended. Pesticide applications should always be attended and monitored.
Using Multiple Tree I.V.’s

Recommended Number of I.V.’s per Applicator:

<table>
<thead>
<tr>
<th></th>
<th>Ring Porous Trees</th>
<th>Diffuse Porous Trees</th>
<th>Conifers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Sized Trees</td>
<td>2-3</td>
<td>3-4</td>
<td>4+</td>
</tr>
<tr>
<td>Larger Trees (&gt;24”)</td>
<td>3-4</td>
<td>4-5</td>
<td>6+</td>
</tr>
</tbody>
</table>

When treating several trees in one area, multiple Tree I.V.’s work very well. Set up your first Tree I.V. then the second then the third. By then the first tree is complete. Remove the first Tree I.V. and set it up on the next tree and continue to “leap-frog” the Tree I.V.’s. This method is efficient. Fast uptake “ring-porous” trees may only need 2 Tree I.V.s to “leapfrog.” Conifers and some diffuse porous trees take longer to treat and may require more Tree I.V.’s for maximum efficiency.
Large Tree Micro-infusion™

600mL is the maximum fill capacity.
If more than 600mL is used, the Tree I.V. requires RE-PRESSURIZING during Micro-infusion.

More than 1 Tree I.V. can be used on the same tree.
Examples:
If dose is 1000mL, put 500mL in 2 Tree I.V. bottles.
If dose is 1350mL, put 450mL in 3 Tree I.V. bottles.

Or Use the Expansion Kit: 010-7016
This includes the Expansion Manifold, plus 4 VIPER Needles, and a Tree I.V. 4 line Manifold.

This allows you to have 8, 12, or 16 injection sites per tree with only 1 Tree I.V. bottle.
Clean Out the Tree I.V.

Before Clean-out: Make sure all product is out of Tree I.V. bottle and lines. CLEAN-jet is for rinsing formulation residues to keep your Tree I.V. operating smoothly.

1. Remove bottle top to release pressure, then add 20-30mL CLEAN-jet (or rubbing alcohol)
2. Apply Tree I.V. Bottle Top and pressurize.
3. OPEN and close each Needle Valve to clean out all lines.

CLEAN-jet rinse can be squirted in the soil at the base of the tree, unless near ground water or waterways.* Rinse all CLEAN-jet out of the bottle, line, and device.

- Small amounts of leftover CLEAN-jet in lines is OK.
- CLEAN-jet should not be mixed with other formulations for long periods of time.

NOTE: If CLEAN-jet solution is stored inside the Tree I.V. device, make sure to push all CLEAN-jet solution out of the system before adding formulation to the bottle.

* Dispose of waste according to local and state regulations.
To Clean out any debris in VIPER Needles:
1. Remove VIPER Needle by pushing the compression fitting in and pulling on the Needle.
2. Push the VIPER Needle Cleanout Tool into the VIPER Needle.
3. Remove in-line debris without VIPER needle attached.

CAUTION: External Hex PTC fittings may break if over tightened. It’s recommended that you hand tighten, then only a ½ turn with a wrench.

Some PTC fittings have a 5/64” internal hex. Use Allen key to tighten, loosen, or remove a broken part.

Make sure to keep device clean by using CLEAN-jet or rubbing alcohol.

Keep o-rings lubricated as needed.
Maintenance: Deluxe Valve & Compression Fitting

Deluxe Valve Cartridges may need periodic cleaning or O-ring replacement.

Deluxe Valve Cartridge
(2 pack 070-0110)

#10 O-ring

#4 O-ring

To restore on/off valve to like new operation, replace valve cartridge #4 O-ring, and #10 O-ring. It is recommended that spare valve cartridges be kept on hand for fast swap out in the field.

Compression fittings quickly connect/disconnect supply lines to other components

Compress the plastic rings to remove tubing.

To connect line, push the end of line all the way into fitting.

Plastic Compression Ring

Push Ring In

Pull Line Out

It could be necessary to re-cut ends of tubing for best fit.
STINGER Method for Tree I.V.

The STINGER Method is only recommended for use in Faster Uptake Trees. The STINGER Method does not use Arborplugs, however the injection may take longer.

1. Drill 5/8” into sapwood (bark depth + 5/8”).

2. Pressurize Tree I.V. Make sure valves are OFF.

3. Attach the Tip Guard. Turn each STINGER ON, and OFF to Prime Supply Lines.

4. Turn each STINGER OFF when Primed.

5. Push STINGER Tips into drilled holes.

Note: Always twist clockwise when inserting or removing.

6. Turn the STINGER ON

TO CLEAN:
Add CLEAN-jet or rubbing alcohol, then push through the system.

Place the STINGER Tip Guard on the STINGER Tip and point the STINGER Tip into a waste container to catch clean-out waste. Dispose of waste according to local regulations.
This is the recommended placement of the STINGER tips in the tree.

- **Recommended**
  - Fast Product Uptake

- **Incorrect**
  - Slow Product Uptake
    - Possible Bark Separation or Leakage
Tree I.V. Replacement Parts

Arborjet offers all the replacement parts you may need for your Tree I.V. Please call 1-866-ARBORJT or visit www.arborjet.com to order parts or find current pricing.

<table>
<thead>
<tr>
<th>Item #</th>
<th>MAJOR TREE I.V. KITS</th>
<th>Kit Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>010-9024</td>
<td>Tree IV Bottle and Cap Ass'y -1tr</td>
<td>Bottle and Cap</td>
</tr>
<tr>
<td>070-0501</td>
<td>VIPER Needle 4-Pack</td>
<td>4 Needles, No Valves</td>
</tr>
<tr>
<td>070-0500</td>
<td>VIPER Valve Assembly 2- Pack</td>
<td>2 Valves and Needles</td>
</tr>
<tr>
<td>070-0510</td>
<td>Deluxe VIPER Needle 4-Pack</td>
<td>4 Needles, No Valves</td>
</tr>
<tr>
<td>070-0520</td>
<td>Deluxe VIPER Valve Ass'y 2-Pack</td>
<td>2 Valves and Needles</td>
</tr>
<tr>
<td>070-0110</td>
<td>Deluxe Valve Cartridge 2-Pack</td>
<td>2 Pack</td>
</tr>
<tr>
<td>010-5005</td>
<td>STINGER Needle Ass'y 4-Pack</td>
<td>4 Needles w/ Valves</td>
</tr>
<tr>
<td>070-0106</td>
<td>Bottle Cap Quick Disconnect Parts</td>
<td>Discon., 90 degree Adapter/ Clamp</td>
</tr>
<tr>
<td>070-0100</td>
<td>PTC 10/32 * 1/4 Push 4-Pack</td>
<td>4 Pack</td>
</tr>
<tr>
<td>070-0101</td>
<td>PTC 10/32 to 5/32&quot; Push 4-Pack</td>
<td>4 Pack</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MINOR TREE I.V. KITS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>070-0104</td>
<td>Mixing and Measuring Kit</td>
</tr>
<tr>
<td>070-0105</td>
<td>Tree I.V. Stand 4-Pack</td>
</tr>
<tr>
<td>070-0107</td>
<td>Spray Shield 4-Pack</td>
</tr>
<tr>
<td>010-3055</td>
<td>Tree IV O-Ring Rebuild Kit</td>
</tr>
<tr>
<td>010-4018</td>
<td>Tree IV Tool Kit</td>
</tr>
<tr>
<td>070-0109</td>
<td>Tree IV Internal Bottle Parts</td>
</tr>
<tr>
<td>070-0120</td>
<td>Arborplug Setter 2-Pack</td>
</tr>
<tr>
<td>070-2000</td>
<td>Drill Bit 2-Pack</td>
</tr>
<tr>
<td>070-0130</td>
<td>Needle Clean-out Tool 2-Pack</td>
</tr>
</tbody>
</table>
Tree I.V. Replacement Parts

Arborjet offers all the replacement parts you may need for your Tree I.V. Please call 1-866-ARBORJT or visit www.arborjet.com to order parts or find current pricing.

<table>
<thead>
<tr>
<th>Item #</th>
<th>TREE I.V. COMPONENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>975-9001</td>
<td>Tree IV Bottle -1 Liter</td>
</tr>
<tr>
<td>975-00113</td>
<td>5 Gallon Bucket - Yellow</td>
</tr>
<tr>
<td>975-00051</td>
<td>Arborjet Deluxe Carrying Case</td>
</tr>
<tr>
<td>070-00200</td>
<td>Carrying Case Strap Kit</td>
</tr>
<tr>
<td>070-00201</td>
<td>Arborplug Field Bag</td>
</tr>
<tr>
<td>070-0102</td>
<td>Tubing 1/4 EVA 5'</td>
</tr>
<tr>
<td>070-0103</td>
<td>Tubing 5/32 Poly 10'</td>
</tr>
<tr>
<td>010-7081</td>
<td>Pressure Pump w/Guage</td>
</tr>
<tr>
<td>070-0140</td>
<td>Compressor</td>
</tr>
<tr>
<td>010-1150</td>
<td>60 PSI Blowoff Assembly</td>
</tr>
<tr>
<td>951-00005</td>
<td>Universal Cap</td>
</tr>
<tr>
<td>070-0108</td>
<td>Tree IV Expansion Manifold</td>
</tr>
<tr>
<td>010-7006</td>
<td>Tree I.V. 5/32&quot;Manifold 4 line</td>
</tr>
</tbody>
</table>

A. Deluxe Valve Cartridge 2-Pack (070-0110)
B. 60psi Blowoff Assembly (010-1150)
C. Cap Universal (951-00005)
D. ¼” Tubing Sold in 5ft (070-0102)
E. Ball Check Valve Assembly (070-0109)
F. Pressure Quick-Disconnect (070-0106)
G. ¼” Push-to-Connect 4-Pack (975-00035)
Tree I.V. Replacements Parts

Arborjet offers all the replacement parts you may need for your Tree I.V. Please call 1-866-ARBORJT or visit www.arborjet.com to order parts or find current pricing.

- A. VIPER Needle
  4-Pack
  (070-0501)
- B. PTC 10/32 to 1/4” Push
  4-Pack
  (070-0100)
- C. PTC 10/32 to 5/32” Push
  4-Pack
  (070-0101)
- D. 1/4” Tubing
  Sold in 5ft
  (070-0102)
  OR
  5/32” Tubing
  Sold in 10ft
  (070-0103)
- E. Deluxe Valve Cartridge
  2-Pack
  (070-0110)
For more of these parts order:

Tree I.V. O-ring Rebuild Kit
010-3055

Includes:
• (5) #4 O-rings
• (5) #10 O-rings
• (2) #8 O-rings
• (4) VIPER Needle Washers
• (1) Med Bottle Washer