High Volume Macro-Infusion Guide

DIY Equipment Checklist

Equipment	Recommendation or Use
☐ Macro-Infusion pump*	115v plugs into outlet, 12v pump clips to a marine battery
☐ 75 injection tees*	Use 1 tee for every 1.5" of DBH
☐ 3 connector tees*	To connect plastic tubing into multiple pathways
☐ 110' of tubing*	To create the harness between the infusion tees ¼" inside diameter – 3/32" wall size
☐ 2 15/64" high helix drill bits*	Replace every 5 trees for best uptake and chemical distribution
☐ Reservoir	For containing solution. 55 gallon trash cans work well
☐ Extension cords	For plugging in drill and/or 115v pump (if necessary)
☐ Deep cycle marine battery	For powering 12v pump (if necessary)
☐ Electric drill	The Tree Geek recommends 18 volt models
☐ Wire or straightened paper clip	For unclogging tees
☐ Measuring or diameter tape	For measuring a tree's diameter
☐ Small hammer	To lightly tap leaking tees
☐ Spade	For digging out the root flares
☐ Hand trowel or V-shaped hoe	For pulling soil away from root flares
☐ Hand brush	To clean soil off root flares
☐ Rake and broom	For clean-up

These items are all included in our Macro-Infusion Kits (#5305 115v Kit, #5306 12v Kit)

Product Overview:

Macro-Infusion rapidly introduces a large volume of solution directly into a tree's vascular system. Macro-infusion delivers complete and even distribution of solution throughout the canopy which provides for predictable results.

Be certain to read ALL the instructions covered in this application guide. Refer to the appropriate product guide and product label for dosage and mixing instructions.

Equipment Assembly

Tools needed:

- ☐ Hose cutter or knife
- ☐ Tape measure
- ☐ Bucket of warm water

Assembly Instructions:

1. Cut tubing into the following lengths:

a. 74 – 1 foot sections (harness tubes)

b. 2 – 10 foot sections (secondary supply tubes)

c. 1 – 4 foot section (primary supply tube)

d. 2 -6 foot sections (bypass tubes)

2) Assemble harness

a. Place tubing in hot water to soften. Insert the infusion tees into the 1 foot lengths of tubing. Make sure to get the tubing over at least the first two ribs of the tees. Be careful not to puncture the tubing.

b. Attach all of the 1 foot lengths of tubing together with infusion tees to create the harness. The harness sections can be assembled or broken down to any size lengths depending on the diameter of the tree. It is easier to work with several smaller sections rather than one long section when setting up a tree for macro-infusion.

3) Assemble supply tubes to the pump

a. Attach 4 foot section of tubing (primary supply) to the male tubing barb on pump

b. Attach connector tee to the opposite end of the primary supply tube.

c. Attach one 10 foot section (secondary supply tubes) to each side of the connector tee at the end of the primary supply tube.

d. Attach a connector tee to the opposite end of each secondary supply tube.

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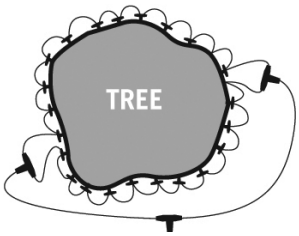
3


4


5a



5b

Step 1: Inspecting the Tree

- Inspect tree for girdling roots, root rot, or any other sources of stress that may be affecting tree health.
- Determine how much root flare excavation is needed to make the infusion sites 4-8 inches below the crest of the root flare.
- Not all trees require excavation if the root flares are visible.
- Do not treat trees with significant rot or girdling roots.
- Inspect canopy for significant die back or stress. This may compromise uptake time and distribution.

Step 2: Determining Dosage

- Refer to the appropriate product guide and product label to determine dosage. Always follow product label dosing and mixing instructions.

Step 3: Excavating the Root Flares

- Use a shovel or trowel to remove sod and soil without damaging the tree.
- Thoroughly brush soil from root flares using a coarse hand brush. **(See Photo 3)**
- Soil left on the root flare can dull the drill bit, clog the infusion sites and result in slower uptake time.

Step 4: Drilling the Infusion Sites

- Use a clean, sharp, 15/64" diameter, high helix drill bit. (Change drill bit every 5 trees to ensure sharpness).
- Drill perpendicular to the surface of the flare and DO NOT spin the bit in the hole unnecessarily. **(See Photo 4)** Spinning the bit can result in slow uptake.
- Drill holes through the bark about 1 inch into healthy xylem tissue. (depth will vary depending on bark thickness)
- Infusion site depth must be adequate to deliver the product into the active xylem tissue.
- Use 1.5 infusion sites for every DBH inch (approximately 1 infusion site every 4-6 inches) evenly spaced around the root flares.
- Place at least one infusion site on EACH root flare.
- DO NOT place infusion sites into or below dead tissue.
- DO NOT drill into deep valleys or sunken areas.

Step 5: Inserting Tees and Connecting the Harness

- Check each tee to be sure it is not plugged and replace badly damaged tees.
- Firmly insert tees by hand into all infusion sites to form a continuous harness around the tree. Don't push or pound tees to deep. **(See Photo 5a)**
- Open two sections of the harness on opposite sides of the tree.
- Attach the supply tubing from the pump to feed into the harness in these two locations. **(See Diagram 5b)**

Step 6: Starting the Infusion

- Always begin infusion with water only.
- DO NOT submerse the pump in water. Only the intake and overflow hoses need to be put into the reservoir.
- Prime the pump by pouring water into the intake hose until it is full. Submerse the hose into the reservoir immediately, preventing any air from entering the hose.
- Start the pump by connecting it to a power source. A 12v pump should be connected to a deep cycle marine battery that is optimized for low-power. Connect the red wire to the positive, or red battery terminal. Connect the black wire to the negative, or black battery terminal.

Step 7: Mixing the Product

- Turn pump off.
- Add product and remaining water.
- Start infusion again.

Step 8: During the Infusion

- Maintain pressure at 15-20 psi by occasional pumping.
- Monitor infusion sites for leaks.
- Lightly tap any leaking tees with a small rubber mallet.
- If an infusion site continues to leak, drill a new hole or bypass it with a piece of bypass tubing.

Step 9: Cleaning Up

- After all the solution has emptied and air is drawn into the harness, depressurize the pump tank.
- Disconnect the supply tubes from the harness. Always keep the supply tubes connected to the pump.
- Remove tees from the tree and disconnect the harness in sections for easier assembly next time.
- Replace soil and sod around the base of the tree.
- **DO NOT treat drill holes with wound paint or other sealing compounds.**

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Troubleshooting

Slow Uptake

- Use high quality water. Water of poor quality (dirty, high pH, etc.) may significantly compromise uptake.
- Make sure the infusion is done on the root flares. If not, distribution and uptake will be compromised.
- Make sure the tees are not clogged from dirt and grit.
- DO NOT pound tees in too far, this will block the flow of solution to active xylem.
- Check your drill bit. Use only clean, sharp, high helix drill bits. Dull drill bits may cauterize the xylem and result in slow uptake. Replace bits every 5 trees for best uptake.
- Water the tree a day before the infusion if drought stress is a problem. Drought stress may cause trees to transpire less. Maintain adequate soil moisture throughout the growing season.
- Make sure your spacing of injection sites is correct. Spacing should be 4-6" apart. Spacing over 6" will compromise distribution and uptake
- Check for large air bubbles in the harness. Pull a tee near the air bubble to release. Large air bubbles will compromise distribution and uptake.
- Keep pressure between 15-20 psi.

Leaking

- Check to see if any tees are broken.
- The hole may have been drilled into dead wood. Re-drill higher up on the flare. If leaking persists, use a longer piece of tubing to bypass that injection site.
- Look closely at where the leak is coming from. It may be coming from another hole in the tree such as a previous year's injection site.
- Plug a leaking infusion site by connecting a 12" harness tube to both ends of a tee to create a loop as shown.

No Pressure

- Make sure the rubber o-ring seal inside the filter housing is present. Rubbing a small amount of petroleum jelly on the o-ring can help create a better seal. If this still doesn't work, replace o-ring.
- Check the tip of the intake hose for debris or suction against the reservoir.

Maintenance and Storage

- Do not store equipment in a vehicle for a prolonged period of time. High or low temperatures reduce longevity.
- At the end of each application, make sure to flush water through the pump and harness to prevent buildup of chemical in the system.
- Do not store pump in temperatures below 41° F/5° C.
- Do not run the pump dry. Prolonged dry operation will overheat and damage the pump.
- If the pressure gauge shows a pressure when there should be none, vent the gauge by perforating the rubber seal at the top of the gauge to equalize the atmospheric pressure
- When testing the pump do not be concerned that the pressure gauge does not rise above 8-10 psi. This is due to the lack of resistance when the harness is not connected to a tree. To check the pressure gauge, cinch the end of the tubing to restrict the flow of water through the pump.
- **Warning: Failure to follow these guidelines could result in pump malfunction.**

DIY Replacement Parts

Item #	Item Description
☐ 5301	High Volume 115v Macro-infusion pump only
☐ 5302	High Volume 12v Macro-infusion pump only
☐ 5309	Supplemental Kit (110 feet of tubing, 75 injection tees, 3 connector tees, 2 high helix drill bits)
☐ 5310	Tubing (110 feet)
☐ 5311	Infusion tees (75 pack)
☐ 5313	Pressure Gauge
☐ 5314	15/64" High Helix Drill Bits
☐ 5381	Screen filter
☐ 5382	Rubber O-Ring for filter system

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