

Wedge[®] Direct-Inject[™] TREE INJECTION SYSTEM



Instruction Guide

The Wedge Direct-Inject Tree Injection System features two Quick-Connect (QC) couplers. The QC coupler on the top of the unit lets you easily attach chemical packs to the injection unit. The QC coupler on the front of the unit accepts a variety of injection tips. With the QC couplers, you simply slide back and hold the outer ring, insert a chemical pack or injection tip, then release—the coupler snaps back and locks in place.

Preparing for use

Remove and save the dust plugs

The two QC couplers on the injection unit are fitted with dust plugs (#18). **The dust plugs must be removed prior to use, and should be saved and reinserted when the unit is not in use.** Locate the QC coupler on top of the unit. Slide and hold down the outer ring of the coupler. Remove and save the dust plug. Repeat on the front QC coupler.

Priming the Wedge Direct-Inject unit

It is preferable to prime the unit with an ArborSystems water pack to avoid wasting chemical. To attach the water pack to the injection unit, first remove the white plastic cap from a 120 ml water pack (be sure to keep the white plastic cap). Locate the QC coupler on top of the unit. **Slide and hold down the outer ring of the coupler.** Insert the stem of the pack into the coupler. Release the coupler to secure the pack to the Wedge Direct-Inject unit.

Prime the unit without an injection tip attached. Always prime the unit with the injection tip removed. Prime by squeezing the handles rapidly several times, forcing the air out of the unit. Continue to squeeze the handles till water comes out the unit.

When the unit is primed, slide and hold down the outer ring of the top coupler to remove the water pack. Replace the white plastic cap on the pack when the pack is not attached to the Wedge Direct-Inject unit.

Attaching a chemical pack

To attach any ArborSystems 120 ml chemical pack to the injection unit, first remove and save the white plastic cap, then attach the pack to the unit following the same process as attaching a water pack (as described above).

To attach a 1000 ml chemical pack, you will need the high-volume hose included in the High-Volume Kit. (Sold separately, see page 5.) Using the coupler process, attach one end of the hose to the top QC coupler; attach the other end to the 1000 ml chemical pack.

Attach an injection tip (see instructions on next page). Squeeze the handles on the injection unit twice to remove the water from the unit. Be sure to replace the white plastic cap on any pack when pack is not attached to the injection unit.



How-To Videos



Many of the use and maintenance instructions in this brochure are also offered in video form on our website. Visit the How-To section of our website to view these helpful How-To Videos.

View at www.ArborSystems.com



Injection Tip Options (See Tip photos on page 4)

The Wedgle® Tip was designed to inject hardwoods. The Wedgle Tip has a patented wedge-shaped end that delivers chemical to the cambial zone between the bark and outer ring of sapwood (the xylem). The Wedgle Tip is inserted into the tree while attached to the Wedgle Direct-Inject unit and is used with WedgeCheks™ which are small plugs that keep the chemical in the tree after the injection is made.

The Portle® Tip was developed for use with conifers. Portle Tips have multiple ports, or openings, along the tip which deliver chemical to numerous points in the inner active layers of conifers, and allows you to inject more chemical at each injection site when desired. A check valve in the hub of the tip keeps chemical in the tree until it is absorbed so WedgeCheks are not needed. Absorption may take up to five minutes.

The Portle Tip has also proven beneficial when injecting tough-barked hardwoods such as hackberry and hickory, thick-barked hardwoods such as elm and eucalyptus, or when the bark of any type tree becomes harder to penetrate when making late summer or fall injections. The short Portle Tip works well for injecting Sycamore and London Plane trees that can be difficult to inject with the Wedgle Tip.

The WedglePlus™ Tip, like the original Wedgle Tip, is used with a WedgeChek which keeps chemical in the tree when the tip is withdrawn. However, when tree pressure is high, chemical may be pushed out of the WedgeChek if the tip is withdrawn too quickly. With the WedglePlus Tip, you can disconnect the injection unit from the tip and allow more time for the tree to absorb the chemical before removing the tip. This will virtually eliminate leakage.

The Palm Tip is a longer, heavier tip designed to penetrate a palm's outer husk and deliver chemical deep into the inner active layers.

Deluxe Wedgle Direct-Inject Kit comes complete with the Wedgle Direct-Inject unit, the Tip Setter, a starter selection of Wedgle and Portle Tips, and all the tools you need, securely contained in a durable carrying case. The Standard Kit is identical except that the Tip Setter and Portle Tips are not included.

Injecting Hardwoods

1. **Select the correct length tip.** The standard .75" Wedgle Tip is used for most hardwood trees; the longer 1.5" tip is for thick-barked trees such as elms and eucalyptus.

To determine which length tip to use, grasp a short Wedgle Tip at the hub, then push it through the bark until you feel resistance of the tip as it reaches the outer ring of sapwood (xylem). If you do not feel the tip reach the wood, switch to the longer Wedgle Tip.

2. **Attach a Wedgle Tip** to the front QC coupler by sliding back the coupler and inserting the tip hub. Release to lock the tip in place. Be sure to position the tip so the small hole on the barrel of the tip is directed upward.

3. **Position the deflector shield.** Slide the shield (#46) over the tip until positioned snugly against the hub. Set the injection unit aside.

4. **Remove a bark core.** Working around the flare of the tree, within 12" of the ground, insert the WedgeChek Punch into the tree and rotate the punch in both clockwise and counterclockwise motions. Withdraw the punch with a straight motion, removing a small core of bark from the tree. Squeeze the punch trigger to remove the bark core from the punch into the palm of your hand. Examine the core to make sure the entire core has been removed. If part of the core remains in the tree, the WedgeChek may not seat properly. Use the punch to remove the remaining core or repeat the procedure at a new location.

Note: Avoid moving the punch side to side or up and down as this may enlarge the hole in the bark and cause the WedgeChek to not seat firmly.



5. **Insert a WedgeChek** into the site where bark core has been removed. Place the WedgeChek (#72) on the protruding pin on the handle of the WedgeChek Punch, then insert the WedgeChek directly into the punched site until the WedgeChek flange is flush with the outer bark of the tree. The barbs on the WedgeChek will secure it in the bark. See notes below on treating thin-barked trees.



6. **Slide the Wedgle Tip through the WedgeChek** and bark with a straight, gentle motion until you feel resistance of the tip meeting sapwood. Do not jab Wedgle Tips into a tree, as tips may bend or break.

Do not force the tip into the sapwood. Only moderate hand pressure is needed. If the correct tip length was selected, it will usually be inserted no more than three-quarters of the length of the tip. The tip should be inserted so chemical will be delivered to the cambial zone; between the bark and the outer ring of sapwood (xylem).

7. **Squeeze both handles of the injector** at the same time, using a smooth, firm motion. This places a pre-measured dose of chemical into the cambial zone between the bark and the xylem, where it can easily be absorbed. Apply equal pressure on both handles—unequal pressure may bend or break the tip. Follow chemical label instructions to determine correct dosage, and number and spacing of injection sites.

8. **Slowly remove the Wedgle Tip from the tree.** The self-sealing WedgeChek plugs the hole. Repeat these steps while moving around the flare of the tree. Leave the WedgeCheks in the tree. Tree growth will eventually push the WedgeCheks out.

9. **If using a WedglePlus Tip** you may remove the injection unit from the tip, allowing additional time for the tree to absorb chemical while you make other injections. Use the check valve in the tip hub to test if chemical has been fully absorbed. See step 7. on page 6 for more details.

Wedgle Direct-Inject unit is preset to release a 1 ml dose of chemical with each full stroke of the handles. If you desire to inject a .5 ml dose of chemical, move the dose adjustment ring (#25) to the .5 ml dose adjustment groove (#52). This will limit the handle stroke so the unit will release a .5 ml dose of chemical.

Avoiding chemical waste: Any time you remove a chemical pack (after making injections), there is approximately 2.5 ml of chemical retained in the injection unit. To avoid wasting this chemical, remove the chemical pack before making your final injections. You will be able to make two additional 1 ml injections (or four or five .5 ml injections) with the chemical remaining in the injection unit. Be sure and replace the cap on the chemical pack when you remove it from the injection unit.

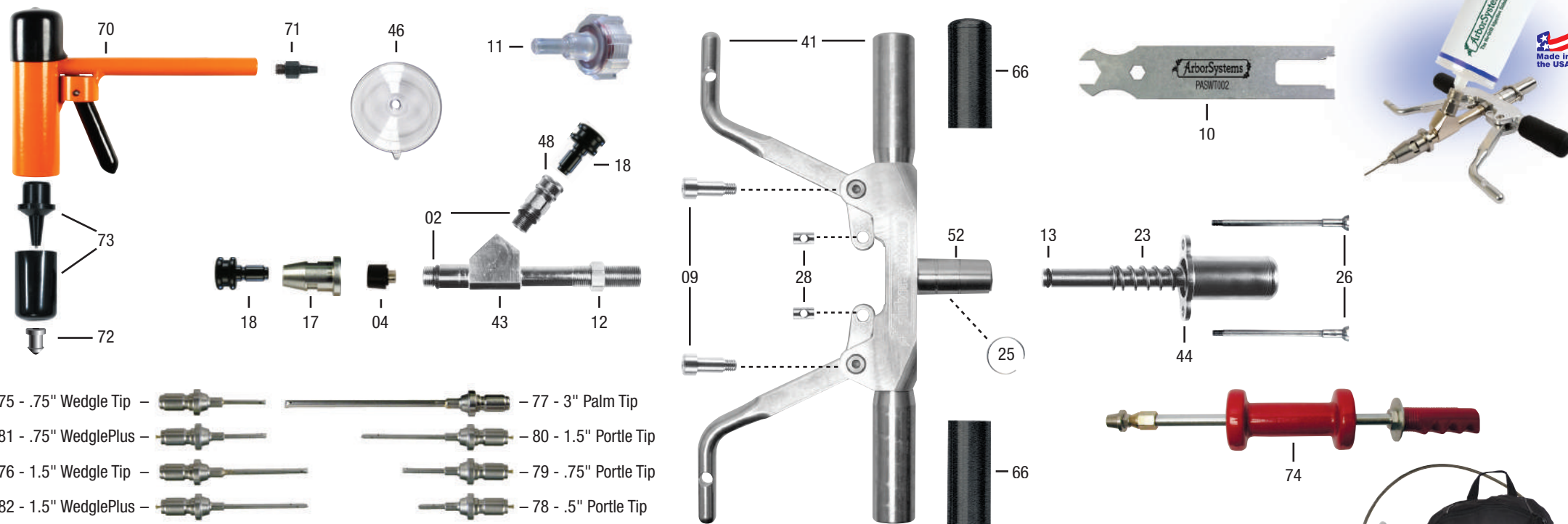
Benefits of making injections at the base, or flare, of the tree:

- When controlling cambial feeding borers, it is crucial that injection occurs in the flare, so the entire trunk is treated. Chemical will distribute more evenly throughout the tree.
- Injecting greater volumes of chemical such as fungicides is easier.
- For tough-barked trees, such as hackberry and hickory, the flare offers a more pliable area of injection.
- If any sap or chemical seepage occurs, it is less visible at the base of the tree.

Timing of applications: Spring through late summer is the ideal time for injecting hardwoods. The bark needs to be pliable, and that depends on the growing season. Chemical injected too early or too late in the season may not be absorbed because of slow or no translocation occurring in the tree. Read and follow chemical label instructions.

Notes on treating thin-barked trees: Chemical retention is improved when injections are made through the thickest available bark, generally found around the flare or base of the tree. You may reduce the amount of chemical per injection and increase the number of injection sites. Do not be concerned if the WedgeChek does not fully insert into the bark—barbs will hold the WedgeChek in place.

Parts Chart for the Wedge® Direct-Inject™ Tree Injection Unit and Accessories (Parts are not shown to scale)



- 75 - .75" Wedgle Tip -
- 81 - .75" WedglePlus -
- 76 - 1.5" Wedgle Tip -
- 82 - 1.5" WedglePlus -
- 77 - 3" Palm Tip
- 80 - 1.5" Portle Tip
- 79 - .75" Portle Tip
- 78 - .5" Portle Tip

| # | Part # | Description | # | Part # | Description |
|-----|----------|---------------------------------------|----|--------------|---|
| 02 | PASW202 | QC Coupler Outer O-Ring | 73 | PAWP73 | WedgeChek Adapter, Rubber Sleeve |
| | PASW203 | QC Coupler Inner O-Ring (not shown) | 74 | PAWP270 | Tip Setter |
| 04 | PASW204 | Replaceable Outlet Check Valve | 75 | Wedge.75 | .75" Wedgle Tip |
| 09 | PASW209 | Screw Lever Pivot | 76 | Wedge1.5 | 1.5" Wedgle Tip |
| 10 | PASWT002 | Multi-purpose Tool | 77 | Palm3 | 3" Palm Tip |
| 11 | PASWT003 | Garden Hose Adapter | 78 | Portle.5 | .5" Portle Tip |
| 12 | PASW12 | Lock Nut | 79 | Portle.75 | .75" Portle Tip |
| 13 | PASW13 | Piston O-Ring | 80 | Portle1.5 | 1.5" Portle Tip |
| 17 | PASW217 | Front QC Coupler | 81 | WedgePlus.75 | .75" WedglePlus Tip |
| 18 | PASW218 | Dust Plugs | 82 | WedgePlus1.5 | 1.5" WedglePlus Tip |
| 23 | PASW23 | Piston Spring | | PASWK201 | Annual Maintenance Kit |
| 25 | PASW25 | Dose Adjustment Ring | | | (1) Piston O-Ring-#13 |
| 26 | PASW226 | Piston Connector Rod | | | (2) QC Coupler Outer O-Rings-#02 |
| 28 | PASW28 | Lever Nut | | | (2) QC Coupler Inner O-Rings-#03 |
| 41* | PASW241 | Handle and Lever Assembly | | | (1) WedgeChek Punch Tip-#71 |
| 43 | PASW243 | Main Body | | PASWK203 | Annual Maintenance Kit for units with Replaceable Outlet Check Valve |
| 44 | PASW244 | Piston and Cap Piece | | | (1) Piston O-Ring-#13 |
| 46 | PASW246 | Deflector Shield | | | (1) QC Coupler Outer O-Rings-#02 |
| 48 | PASW248 | Top QC Coupler | | | (2) QC Coupler Inner O-Rings-#03 |
| 52 | | .5 ml Dose Adjustment Groove | | | (1) WedgeChek Punch Tip-#71 |
| 66 | PASW66 | Rear Hand Grips | | | (1) Replaceable Outlet Check Valve-#04 |
| 70 | PAWP70 | WedgeChek Punch (includes 70, 71, 73) | | PASWK202 | Small Parts Kit |
| 71 | PAWP71 | WedgeChek Punch Tip | | | (1) Dose Adjustment Ring-#25 |
| 72* | | WedgeChek™ | | | (1) Piston Connector Rod-#26 |
| | | | | | (1) Screw Lever Pivot-#09 |
| | | | | | (1) Lever Nut-#28 |

*Not sold separately.

High-Volume Kit (Sold separately)

Make up to 1000 injections without reloading chemical. Simply attach the hose to the Wedge Direct-Inject unit and the 1000 ml chemical pack, prime, and inject. No other tools, equipment, or power supply are needed.

1. Remove the yellow cap from the hose guide by unscrewing. Remove the adaptor sleeve from inside the hose guide.
2. Slide the High-Volume hose through the yellow cap and into the hose guide, pulling the hose through the chemical pack cage and out the top of the backpack.



3. Attach the hose to a 1000 ml chemical pack using the same method as you attach a 120 ml chemical pack to the injection unit (see instruction on page 1).

4. Carefully pull the hose and chemical pack into the cage inside the backpack until the chemical pack rest snugly against the hose guide.

5. Secure the chemical pack in the cage with the closure pin.
6. Place the adaptor sleeve over the hose and slide the sleeve into the hose guide.

7. Screw the yellow cap onto the hose guide and hand tighten.

8. Attach the hose to the top QC coupler on the injection unit.

9. Prime and you are ready to begin injecting.



Injecting Conifers, Palms, and some Hardwoods



Conifers, palms, and some hardwoods may be treated using the Wedgle Direct-Inject unit with Portle or Palm Tips and the Tip Setter. The Tip Setter is used to drive these heavier injection tips deep into the active areas of conifers and palms, or through thick, tough outer bark of some hardwoods.

WedgeCheks are not needed when using Portle or Palm Tips. You will need multiple tips to treat each tree; several of each type of tips, as well as the Tip Setter, are included in the Deluxe Wedgle Direct-Inject Kit. Additional tips may be purchased separately.

Note: Many conifers contain resin that may clog Portle Tips. Read all instructions before making injections.

1. Connect a Portle Tip or Palm Tip to the Tip Setter.

The Tip Setter (#74) uses a QC coupler to hold the injection tips in place. Slide back the coupler, insert the hub end of a tip, then release to secure the tip in the setter.



2. Tap the injection tip into the tree

using the sliding action of the Tip Setter. Place the tip against the bark, selecting a location where the bark is firmly adhered to the tree. Grasp the slide. Beginning gently, then with increasing force, tap the tip into the tree until the front of the hub is in tight contact with the bark.



It is important to keep the rear handle of the Tip Setter directly behind the tip in order to guide the tip into the tree without bending the tip. When inserting or removing Portle or Palm Tips, it is important to keep the setter perpendicular to the tree. Do not twist or move the setter or injector unit side to side, as this may bend or break the injection tip.

3. Disconnect the setter from the injection tip.

Pull back on the QC coupler, remove the setter, and leave the injection tip in the tree.

Important note on avoiding resin clogging:

When treating conifers it is best to insert one Portle Tip, make the chemical injection (see following instructions), and leave the tip in the tree until the chemical is absorbed. **Many conifers contain resin that may clog Portle Tips if they are left in the tree too long** before making the chemical injection, or if they are left in the tree longer than is necessary to allow the chemical to be absorbed. **To avoid clogging**, make the chemical injection immediately

after inserting the tip and remove tip as soon as chemical is absorbed. Read all instructions before making injections.

When treating palms or hardwoods you may continue inserting tips around the tree, following the spacing and number of injection sites information on the chemical label.

4. After tips are set in the tree, connect the Wedgle Direct-Inject unit to the tip.

While pulling back on the front QC coupler, slide the injection unit over the tip, then release the QC coupler to lock the injection unit to the tip.

5. Squeeze both handles of the injector

at the same time using a smooth, firm motion. This delivers a pre-measured dose of chemical into the tree. Apply equal pressure on both handles—unequal pressure may bend or break the tip. Follow chemical label instructions to determine correct dosage, and number and spacing of injection sites.

6. After completing the injection, disconnect the injection unit from the tip.

Leave the tip in the tree. **Do not pull the tip out of the tree while it is connected to the injection unit**, as this may cause unwarranted damage to the injection unit or injection tip.

7. Check that absorption is complete.

Tip should not be removed from the tree until the chemical has been absorbed, which may take up to five minutes. Individual trees absorb chemical at different rates and weather conditions affect absorption rate. You may need to leave the Portle Tips in some trees longer than others, depending upon how fast the tree is absorbing the chemical.

Each Portle Tip has a check valve in the hub which keeps chemical from coming out after the injection unit is disconnected from the tip. The check valve is visible only after the injection unit has been removed from the tip. To test if the chemical has been fully absorbed, slightly depress the check valve in the tip hub. If chemical comes out of the check valve, wait a minute or two and retest. If no chemical comes out, the tip is ready to be removed.

Palm Tips Due to the absorbent nature of palms, check valves are not required. Palm Tips can be removed immediately after making injections.

8. Remove the injection tips from the tree.

Reconnect the setter to the tip and slowly remove the tip by pulling firmly on the slide with a straight rearward motion. Hold the setter perpendicular to the tree to avoid bending the tip.

Troubleshooting



If your injector will not prime or if you suspect that your injector is not delivering 1 ml per injection, the problem most likely will be in either the inlet or outlet check valves. The following steps will assist you in determining which check valve is at fault. You will need the Multi-purpose Tool (#10), a Garden Hose Adapter (#11), garden hose or spigot, and the malfunctioning injection unit.

A. Troubleshooting the inlet check valve

This is the check valve in the top QC coupler (#48).

1. Remove the injection tip and chemical pack from the injection unit.
2. Attach the garden hose adapter to a garden hose or water spigot.
3. Insert the garden hose adapter into the top QC coupler. *
4. Slowly turn on the water. The water should come out of the front QC coupler. **If it does, proceed to section B.**
5. If the water **does not** come out of the front QC coupler, turn off the water and remove the garden hose adapter from the top QC coupler.
6. Remove the top QC coupler using the multi-purpose tool.
7. Attach the garden hose adapter to the unattached top QC coupler.
8. Slowly turn on the water and observe if water flows through the top QC coupler. If water flows through the top QC coupler, the inlet check valve should be operating correctly. Proceed to section B.



If water does not flow through the top QC coupler, the coupler is defective or damaged and must be replaced. Contact your distributor or ArborSystems for a replacement top QC coupler.

* NOTE: The Garden Hose Adaptor is not designed to “snap” into the couplers. Slide back the outer ring of the coupler and insert the adaptor. The outer ring of the coupler will not return to the “locked” position while the adaptor is in use.

NOTE: If you have injected more than 2 ml of chemical in a single injection site, some chemical may follow the tip out of the tree as you withdraw it, regardless of how long the tip has been in the tree. Withdrawing the tip slowly will minimize chemical loss.

B. Troubleshooting the outlet check valve

This is the check valve near the front QC coupler (#17).

9. You should have already completed steps 1-4 in section A. If you have not already done so, turn off the water, remove the hose adapter and then remove the top QC coupler.
10. Insert the garden hose adapter into the front QC coupler. *
11. Slowly turn on the water and observe if water flows out the top of the injector where the top QC coupler attaches. Turn off the water. NOTE: When check valve is working correctly, water should **not** flow in this direction.
 - a. If water flows in the reverse direction (out of the top), the outlet check valve is not working properly.
 - b. Newer injectors are equipped with a Replaceable Outlet Check Valve (#04). Follow the steps outlined in the Replaceable Outlet Check Valve section on page 8.
 - c. If your injector is not equipped with a replaceable outlet check valve, you may be able to remedy the problem by reattaching the front QC coupler and repeating all of the troubleshooting steps.
 - d. If water continues to flow in the reverse direction, contact your distributor or ArborSystems for assistance.



12. Successfully completing these steps should have corrected the priming issues. Reattach the top QC coupling and try priming the injector again. **If your injector fails to prime, contact your distributor or ArborSystems for assistance.**



Make your last several injections of the day after removing the chemical pack; see Avoiding Chemical Waste note on page 3. Dispose of any chemical remaining in the injection unit following label instructions.

Daily water flush

When you are finished making injections for the day, it is important to water flush your Wedgle Direct-Inject unit. This will keep the injection unit from clogging.

Note: After injecting Mastiff PGR, you must first flush the unit with ArborSystems Cleaning Solution, then water flush.

You can water flush the injection unit using a container of **clean** water or the Garden Hose Adapter (#11). When using the container method, submerge the unit until the top QC coupler is underwater, then squeeze the handles five to ten times to flush the unit. To use the garden hose adapter, follow the instructions at right. After flushing the unit, remove the injection tip from the injection unit. Replace dust plugs on both QC couplers.

Replaceable Outlet Check Valve

Newer models of the injection unit are equipped with a Replaceable Outlet Check Valve (#04). If you have determined that the outlet check valve is not operating correctly (see Troubleshooting, section B, on page 7) and your injector will not prime, remove the front QC coupler (#17), remove the Replaceable Outlet Check Valve (#04), insert a new check valve into the Main Body (#43), and reattach the front QC coupler. If you have an older injection unit without a Replaceable Outlet Check Valve, contact your distributor.

Replace piston O-ring each spring

At the beginning of each growing season, or if your injection unit has been unused for several months, replace the piston O-ring. To replace the piston O-ring, use the screwdriver end of the multi-purpose tool (#10) to unscrew the two piston connector rods (#26). Be careful not to lose the lever nuts (#28) from inside the handles. Pull the piston assembly out of the handle, revealing the piston spring (#23) and the O-ring (#13)—the smallest O-ring in the parts kit).

Prior to reassembly, apply a small amount of lubricant, such as Vaseline® Petroleum Jelly, to the piston O-ring and piston rod. Carefully slide the piston assembly back into the barrel of the handle. If the piston assembly does not slide in smoothly, rotate the piston assembly 180 degrees.

Reattach the connector rods into the lever nuts. These parts are small and can take a little time to align properly. You can use a paper clip to help align the lever nut with the connector rod. When tightening the rods with the screwdriver, make sure there is no play between the right and left handles. A slight adjustment may be necessary. Tighten the rods snugly, but do not over tighten.

QC coupler O-ring maintenance

QC coupler O-rings may be replaced if a coupler is not sealing correctly.

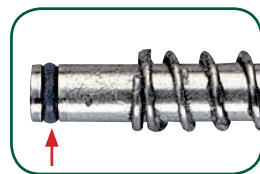
There is a large O-ring (#02) at the base of the top coupler and on the front of the main body. Use the multi-purpose tool to remove the coupler from the injection body and replace the O-ring.

There is a medium-sized O-ring (#03) inside each coupler. These can be replaced while the coupler is attached to the body of the unit. Use a paper clip to remove the old O-ring and to help insert the new one.



Using the Garden Hose Adapter

1. Attach adapter to a garden hose or faucet connection.
2. Slide and hold down the outer ring of the top coupler on the injection unit.
3. Insert the narrow end of the hose adapter into the top coupler.
NOTE: The adapter is not designed to "snap" into the top coupler and the outer ring of the coupler will not return to the "locked" position.
4. Slowly turn on the water supply and allow the water to flush the injection unit.
5. Remove the injector from the hose adapter.



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Direct-Inject™ and Direct-Inject QC™ injection units are protected by U.S. Patent #5,901,498.

Wedgle® Tip is protected by U.S. Patent #5,239,773.
WedgeChek™ is protected by U.S. Patent #5,797,215.
Portle® Tip is protected by U.S. Patent 3,287,015.