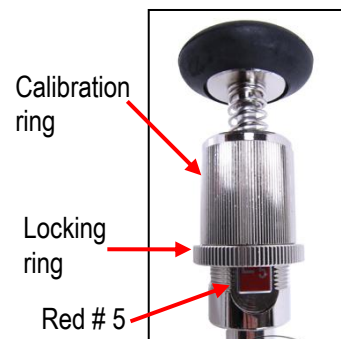


Maintaining, Testing & Adjusting a Kioritz Soil Injector

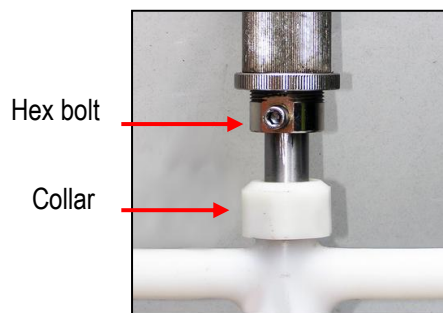
Important: Kioritz soil injectors are no longer made, and most of the replacement parts are no longer available. So if you have one or borrow one, take good care of it. However, if an injector needs maintenance or is not working properly, SGH does have the capability to repair it in most cases. Call the Hemlock Help Line 706-429-8010 for more information.

Inspection before each use

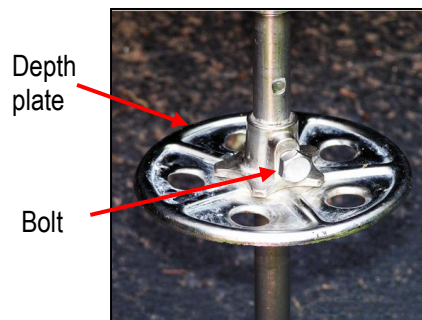
1. Be sure the lower edge of the **tall gridded calibration ring** is set so that it bisects the red number 5 on the calibration plate underneath, and then screw the **thin gridded locking ring** up to tighten the calibration ring in place. This setting governs the amount of liquid dispensed by each pump of the handle, which in this case should be 5 cc of fluid so that six pumps will dispense 30 cc or 1 fluid ounce.



2. The **hex bolt** below the calibration ring should be tight.
3. The white plastic **collar** at the top of the tank should be tight.

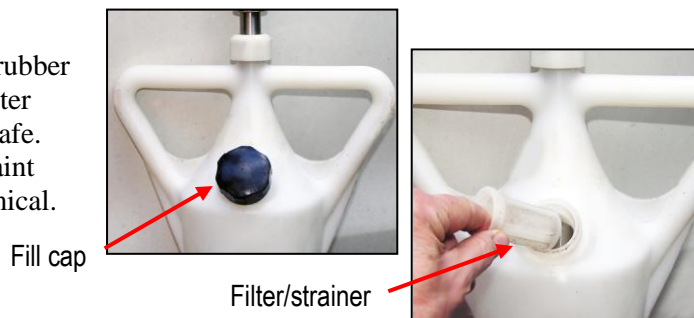


4. The round metal **depth plate** should be positioned with the rounded-side-up and in the lowest indented position on the injection pipe, 5 inches above the probe tip. Note that this is not a “foot step” but governs the depth to which the injector probe penetrates.
5. The **metal bolt** that holds the depth plate in place should be tight. Remove any dirt or debris from the depth plate area.



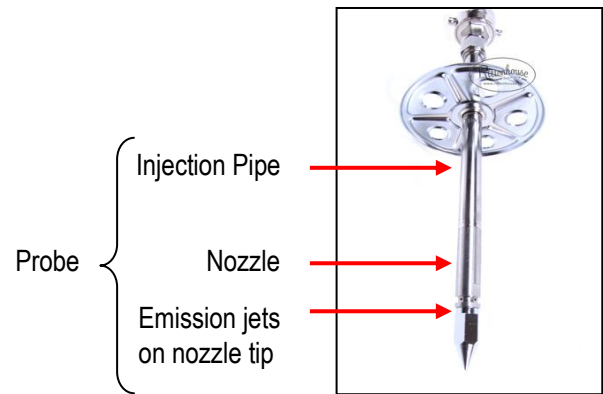
6. Unscrew the black plastic **fill cap** and be sure the rubber or cork gasket is in place. If the original plastic filter is still present, remove it and place it somewhere safe. You'll be using a funnel and cone-shaped paper paint filter instead of the small plastic filter to load chemical.

Note: Whenever you remove the fill cap, place it open side up to avoid getting dirt in the cap.



- Before replacing the cap and filter, look inside the tank to see if there's a crack in the metal tube. If you see even the smallest crack, the injector needs to be scheduled for repair.

- Be sure the probe area is clean and the four emission jets on the nozzle tip are open.



Calibration testing before each use

- Put a couple cups of plain water into the injector tank.
- Pump the handle several times to see if water is ejected equally in all four directions. It should shoot about 6 feet in each direction. If an emitter jet in the nozzle tip is clogged, clean it carefully with a sharp metal tool such as a large safety pin or metal paperclip. Don't use a toothpick or anything that could break off in the nozzle tip. It should go through the tip from one side to the other. Once you've cleaned the holes, retest the injector to be sure it's shooting water out equally in all four directions
- Next, to see if the injector is dispensing the correct amount of fluid per pump, place the injector tip into a heavy duty measuring cup that shows ounces and pump the handle smartly 12 times. *It's a good idea to place a bottle cap in the bottom of the measuring cup to keep the injector tip from puncturing or shattering the cup.*
 - If you get **exactly 2 ounces** of liquid from 12 pumps, the injector is working properly.
 - If it puts out **more than 2 ounces**, adjust the calibration ring upward and retest.
 - If it puts out **less than 2 ounces**, adjust the calibration ring downward and retest. If you move the calibration ring down as far as it will go and still don't get 2 ounces for 12 pumps, see the "Alternate Mixing Instructions for Kioritz Soil Injector" later in this document.
- When you've completed the above testing, pour and pump any remaining water out of the tank.



Using the injector properly

- Mix the treatment product in a clean container according to instructions on the [Resources](#) page of our web site. Liquid treatment products may be mixed with cold water, but powdered or granular treatment products dissolve better in warm water than in cold. Be sure the treatment material is completely dissolved before pouring it into the injector.
- To fill the tank, push the injector probe into the ground under a hemlock tree at a 45° angle so the black fill cap is facing straight up. Unscrew the cap, lay it open side up, and insert a funnel and medium grid, cone-shaped paper paint filter. Pour the liquid slowly into the tank. It will hold up to 96 ounces (3 quarts) of fluid.
- When finished filling, screw the fill cap on before standing the injector straight up.
- Begin the application process immediately.



5. To dispense the treatment mixture, place the palm of your hand on the handle and without lifting your hand from the handle, pump firmly and quickly.
6. Don't use the metal depth plate ring as a "foot step." It will break. Instead, use your upper body strength to push the probe into the ground. Avoid roots and rocks. If you feel resistance in the soil, move the probe an inch or two and try again.
7. Keep using the injector continuously until the tank is empty. If the injector remains motionless for more than about 10 minutes while there is treatment material in the tank, particulate matter may fall out of suspension and clog the injector, especially if you're using a powdered or granular formulation.
8. If fluid begins to run freely from the tip when you're not pumping the handle, it may be because dirt or debris has gotten between the ball and the valve or the spring has become misshapen inside the probe. Try to correct the problem by placing the injector tip on a solid surface (like a rock) and pumping the handle smartly one or two times to try to dislodge any dirt or debris in the probe. If that doesn't work, disassemble the part of the probe that is immediately above the tip. Do this **very carefully** over a light colored towel in some controlled space (preferably not out in the woods). In some models, the ball valve is spring-loaded and can pop out and get lost.
9. Clean the ball valve and the inside of the probe; reshape the spring if necessary or possible; or you may need to replace the ball valve or spring from your spare parts kit. Then reassemble.

Caution: If you're not SURE what you're doing with injector repair, STOP and call the Hemlock Help Line for advice or referral to a local Facilitator who is familiar with the repair process and has the appropriate tools. This is by far preferable to damaging the injector or losing parts that can't be replaced.

Cleaning and storing the injector

1. Clean the injector *immediately* after each use.
 - a. If there is treatment solution left in the tank when you pause for a break during the day, pour it into a mixing jug and cover the jug with a dark towel to protect it from sunlight. You can use this mixture to reload the injector when you're ready to resume treating.
 - b. Try to use all the mixture in the tank before you're finished for the day, but if there's a small amount left, you can pour it or inject it under a hemlock. Don't pour it into a stream or down a drain. Mixed solution doesn't store well.
2. To clean the injector, put a couple cups of plain water into the tank, shake the injector vigorously in all directions to wash the treatment mixture from all parts of the device, and pump the water through until the emission runs clear. You should do this at least three times. Be sure that water is shooting out from the emission jets equally in all four directions when you're finished rinsing the tank.
3. Remove any dirt or debris from the injector (especially the probe), dry it, and store it upside down in a clean dry place where it will not freeze in the winter.

If you have any questions about the testing procedures above, need help in diagnosing an injector malfunction, or need instructions on the cleaning and proper maintenance of a Kioritz soil injector, please refer to "Maintaining a Kioritz Soil Injector" on the Resources page of our web site or call the Hemlock Help Line 706-429-8010.

The attachments that follow contain the following:

- | | |
|--------------|---|
| Attachment A | Alternate Mixing Instructions for Kioritz Soil Injector |
| Attachment B | Kioritz Soil Injector Parts Diagrams |
| Attachment C | Spare Parts Kit for Kioritz Soil Injector |

Attachment A – Alternate Mixing Instructions for Kioritz Soil Injector

These instructions are for use ONLY with Kioritz soil injectors that put out less than the standard 2 ounces of liquid for 12 pumps of the handle. The Mixing ratios have been adjusted to achieve the correct concentration of active ingredient per ounce of output. The Dosing (pumping) instructions remain the same.

To use these instructions:

1. Select the page for the amount of liquid the injector is putting out for 12 pumps of the handle.
Your choices are 1.25 oz, 1.5 oz, and 1.75 oz.
2. Then select the chart for the chemical you are using.
Your choices are Imidacloprid or Safari 20 SG.
3. Note: In the Mixing section on the Imidacloprid charts, you also need to choose the formulation you're using.
Your choices are 2F or 2L liquid products, 75% WSP or WSB powdered products, or 4F / 4L liquid products.

If you have questions, please call the Hemlock Help Line 706-429-8010.

For a Kioritz injector that dispenses 1.25 oz of liquid for 12 pumps of the handle:



IMIDACLOPRID QUICK REFERENCE CHART

FOR THIS KIORITZ INJECTOR ONLY – 1.25 oz Output for 12 Strokes

It is the user's responsibility to read and follow the label instructions when using pesticide materials

MIXING		
Imidacloprid Product	Ratio of Water & Product for Moderate to Wet Soil	Ratio of Water & Product for Dry to Normal Soil
22.6% 2F or 21.4% 2L	0.5 fl oz water per fl oz product or 32 oz water with 64 oz product	2 fl oz water per fl oz product or 64 oz water with 32 oz product
75% WSP (1.6 oz)	7.5 fl oz water per 1.6 oz packet	15 fl oz water per 1.6 oz packet
DOSING		
Inches in Diameter (DBH)	Dosage per Inch DBH for Moderate to Wet Soil Pumps per Inch of Trunk Diameter	Dosage per Inch DBH for Dry to Normal Soil Pumps per Inch of Trunk Diameter
1-11	1 pump	2 pumps
12-18	1.5* pumps	3 pumps
19-22	2 pumps	4 pumps
>22	3 pumps	6 pumps

If using a **Kioritz soil injector** with a **powdered product**, default to the **Dry to Normal Soil** mixing ratio.

Be sure the calibration ring is set on the red 5.

Trees >22" dbh should be treated 2 years in a row.

*To get the equivalent of 1.5 pumps per hole, do 1 pump in half the holes and 2 pumps in the other half, distributing these two levels evenly around the tree. For more information, please call the Hemlock Help LineSM 706-429-8010 or visit www.savegeorgiashemlocks.org.

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SAFARI 20 SG QUICK REFERENCE CHART

FOR THIS KIORITZ INJECTOR ONLY – 1.25 oz Output for 12 Strokes

It is the user's responsibility to read and follow the label instructions when using pesticide materials.

MIXING	
Master Batch for Kioritz Soil Injector	
11.25 oz. product with 32 oz. water	
22.5 oz. product with 64 oz. water	
DOSING	
Inches DBH	Soil Injection (Kioritz): HANDLE PUMPS per Inch DBH
1 – 15	3 pumps
16 – 19	4 pumps
20 – 23	5 pumps
24 - 27	6 pumps
28 – 31	7 pumps
32 – 35	8 pumps
36 – 39	9 pumps
40 or more	10 pumps

Use the plastic measuring device that comes with Safari 20 SG to measure the required amount of product and a regular measuring cup to measure the water.

Be sure the calibration ring is set on the red 5.

Note: Apply Safari® 20SG from Feb 1 to Nov15. For more information, call 706-429-8010 or visit www.savegeorgiashemlocks.org.

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For a Kioritz injector that dispenses 1.5 oz of liquid for 12 pumps of the handle:



IMIDACLOPRID QUICK REFERENCE CHART
FOR THIS KIORITZ INJECTOR ONLY – 1.5 oz Output for 12 Strokes

The Kioritz tank can hold 96 ounces. Use the amounts of product and water indicated below for a full (or nearly full) tank. For each inch of trunk diameter, make one shallow hole 2-4 inches deep in the soil within 12 inches of the base of the tree and do the number of pumps indicated in each hole. Calibration ring should be set on the red 5.

MIXING			
Product Formulation	2F / 2L liquid for moderate to WET soil	2F or 2L liquid for DRY soil	75% WSP powder (1.6 oz)
Mixing Ratio	55 oz product + 41 oz water	27 oz product + 69 oz water	5 packets + 85 oz water
DOSING			
Diameter Inches	2F / 2L liquid – WET soil	2F / 2L liquid – DRY soil	75% WSP powder
1-11	1 pump / inch	2 pumps / inch	2 pumps / inch
12-18	1 1/2 pumps* / inch	3 pumps / inch	3 pumps / inch
19-22	2 pumps / inch	4 pumps / inch	4 pumps / inch
>22 needs treating 2 years in a row.	3 pumps / inch	6 pumps / inch	6 pumps / inch

*To get the equivalent of 1 1/2 pumps per hole, do 1 pump in the odd holes and 2 pumps in the even holes, distributing them evenly around the tree. For more information, call the Hemlock Help LineSM 706-429-8010.

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SAFARI 20 SG QUICK REFERENCE CHART
FOR THIS KIORITZ INJECTOR ONLY – 1.5 oz Output for 12 Strokes

The Kioritz tank can hold 96 ounces. Use the amounts of product and water indicated below for a full tank. For each inch of trunk diameter, make one shallow hole 2-4 inches deep in the soil within 12 inches of the base of the tree and do the number of pumps indicated in each hole. Calibration ring should be set on the red 5.

MIXING	
27 oz. product + 92 1/2 oz. WARM water	
Use the special measuring cup that comes with Safari 20 SG to measure the required amount of product .and a regular measuring cup to measure the water. If you don't have the special measuring cup, you can use a regular measuring cup with the following conversion factor: 8 oz. by volume in a regular measuring cup = 4 oz. by weight of Safari.	
DOSING	
Diameter Inches	PUMPS per Inch
1 – 15	3 pumps
16 – 19	4 pumps
20 – 23	5 pumps
24 – 27	6 pumps
28 – 31	7 pumps
32 – 35	8 pumps
36 – 39	9 pumps
40 or more	10 pumps

Note: Apply Safari® 20SG from Feb. 15 to Nov. 15. For more information, call 706-429-8010.

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For a Kioritz injector that dispenses 1.75 oz of liquid for 12 pumps of the handle:



IMIDACLOPRID QUICK REFERENCE CHART

FOR THIS KIORITZ INJECTOR ONLY – 1.75 oz Output for 12 Strokes

It is the user's responsibility to read and follow the label instructions when using pesticide materials

MIXING		
Imidacloprid Product	Ratio of Water & Product for Moderate to Wet Soil	Ratio of Water & Product for Dry to Normal Soil
22.6% 2F or 21.4% 2L	1 fl oz water per fl oz product or 48 oz water with 48 oz product	3 fl oz water per fl oz product or 72 oz water with 24 oz product
75% WSP (1.6 oz)	10 fl oz water per 1.6 oz packet	20 fl oz water per 1.6 oz packet
DOSING		
Inches in Diameter (DBH)	Dosage per Inch DBH for Moderate to Wet Soil Pumps per Inch of Trunk Diameter	Dosage per Inch DBH for Dry to Normal Soil Pumps per Inch of Trunk Diameter
1-11	1 pump	2 pumps
12-18	1.5* pumps	3 pumps
19-22	2 pumps	4 pumps
>22	3 pumps	6 pumps

If using a **Kioritz soil injector** with **powdered product**, default to the **Dry to Normal** ratio.

Be sure the calibration ring is set on the red 5.

Trees >22" dbh should be treated 2 years in a row.

*To get the equivalent of 1.5 pumps per hole, do 1 pump in half the holes and 2 pumps in the other half, distributing these two levels evenly around the tree. For more information, please call the Hemlock Help LineSM 706-429-8010 or visit www.savegeorgiashemlocks.org.

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SAFARI 20 SG QUICK REFERENCE CHART

FOR THIS KIORITZ INJECTOR ONLY – 1.75 oz Output for 12 Strokes

It is the user's responsibility to read and follow the label instructions when using pesticide materials.

MIXING	
Master Batch for Kioritz Soil Injector	
8 oz. product with 32 oz. water (1 qt) 16 oz. product with 64 oz. water (2 qts) 24 oz. product with 96 oz. water (3 qts)	
DOSING	
Inches DBH	Soil Injection (Kioritz): HANDLE PUMPS per Inch DBH
1 – 15	3 pumps
16 – 19	4 pumps
20 – 23	5 pumps
24 - 27	6 pumps
28 – 31	7 pumps
32 – 35	8 pumps
36 – 39	9 pumps
40 or more	10 pumps

Use the plastic measuring device that comes with Safari 20 SG to measure the required amount of product and a regular measuring cup to measure the water.

Be sure the calibration ring is set on the red 5.

Note: Apply Safari® 20SG from Feb 1 to Nov15. For more information, call 706-429-8010 or visit www.savegeorgiashemlocks.org.

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Adjusted Mixing Instructions for Applying Imidacloprid 4F / 4L by Kioritz Soil Injector

The standard output for a Kioritz injector with the calibration ring set on 5 is 5 ml or 1/6 fl. oz. per pump. Twelve pumps should yield exactly 2 oz. of liquid if it's working properly. If not, use one of the adjusted mixing ratios below and then the standard number of pumps per hole / inch DBH. Be sure the calibration ring is set to bisect the red 5 (i.e., the calibration ring and locking ring at the top of the device are screwed down as low as they'll go).

If the unit dispenses **1.75 ounces of liquid for 12 pumps:**

MIXING	
Imidacloprid Product	Ratio of Water & Product
4F / 4L	71 oz. water with 23 oz. product = 96 oz. of mixture

If the unit dispenses **1.5 ounces of liquid for 12 pumps:**

MIXING	
Imidacloprid Product	Ratio of Water & Product
4F / 4L	68 oz. water with 27 oz. product = 95 oz. of mixture

If the unit dispenses **1.25 ounces of liquid for 12 pumps:**

MIXING	
Imidacloprid Product	Ratio of Water & Product
4F / 4L	63 oz. water with 33 oz. product = 96 oz. of mixture

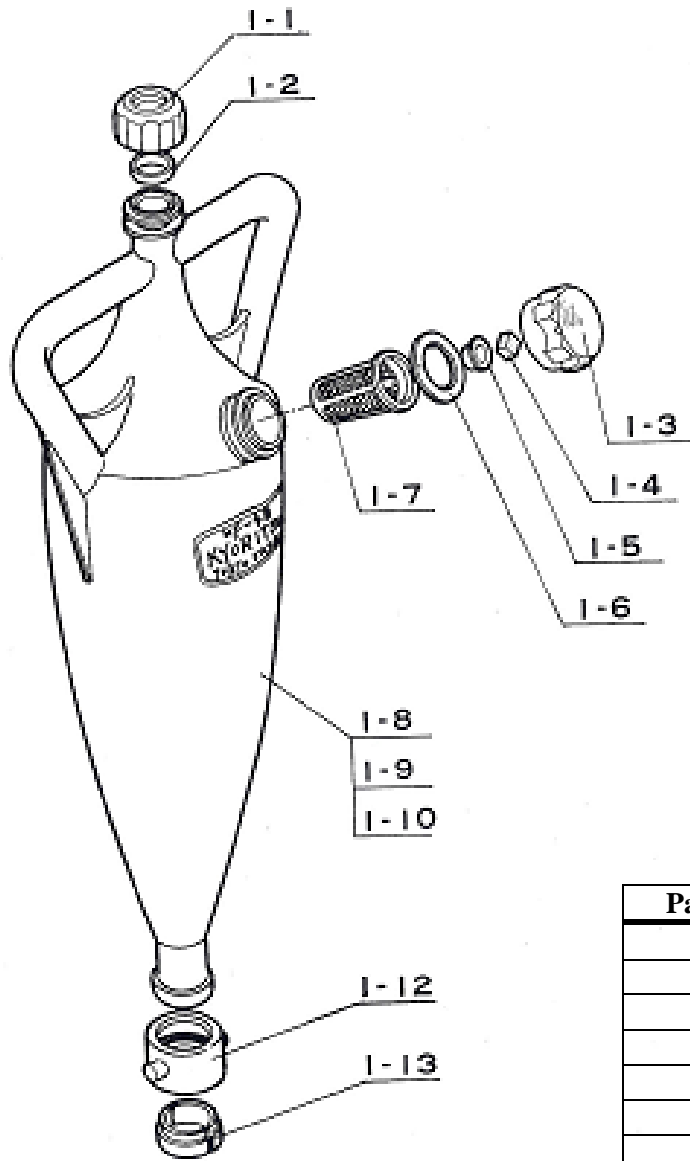
DOSING	
Imidacloprid Product	Application Rate
1-11	1 pump per hole / inch
12-18	1.5 pumps per hole / inch*
19-22	2 pumps per hole / inch
>22	3 pumps per hole / inch**

*To get the equivalent of 1.5 pumps per hole, do 1 pump in half the holes and 2 pumps in the other half, distributing these two levels evenly around the tree. OR multiply the diameter times 1.5 to get the total number of pumps needed, divide that number by 2, and then do 2 pumps each in that number of holes.

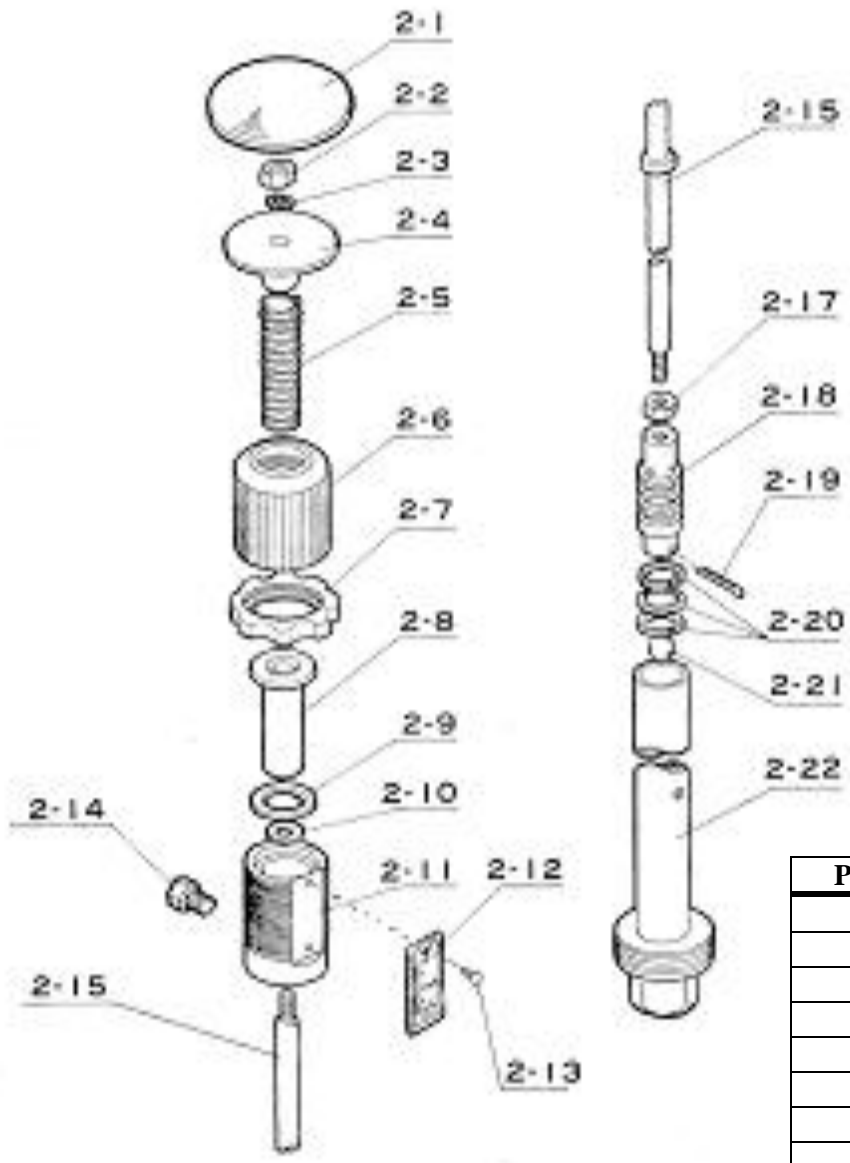
** Trees >22" dbh should be treated 2 years in a row.

CALL THE HEMLOCK HELP LINE 706-429-8010 WITH ANY QUESTIONS.

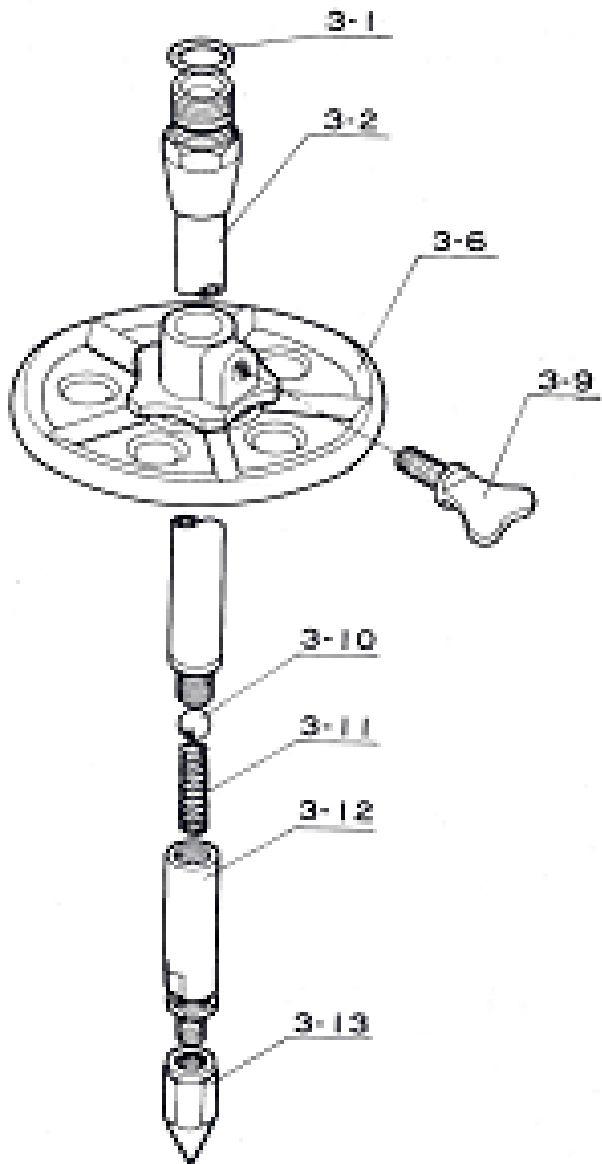
Attachment B – Kioritz Soil Injector Parts Diagrams



Part No.	Part Name
1-1	Cap Nut
1-2	Cap Nut Gasket or Packing
1-3	Fill Cap
1-4	Sponge
1-5	Breather
1-6	Fill Cap Gasket or Packing
1-7	Strainer or Filter
1-8	Tank
1-9	Name Plate
1-10	Caution Plate
1-12	Tank Nut
1-13	Two-part Collar



Part No.	Part Name
2-1	Yielding Rubber / Pommel
2-2	Nut
2-3	Spring Washer(s)
2-4	Butt Plate
2-5	Buffer Spring
2-6	Calibration Ring
2-7	Locking Ring
2-8	Rod Guide
2-9	Packing for top of Adjust Screw
2-10	Packing for bottom of Rod Guide
2-11	Adjust Screw
2-12	Calibration Plate
2-13	Rivet
2-14	Hex Bolt for Adjust Screw
2-15	Piston Rod
2-17	Nut
2-18	Piston
2-19	Split Pin
2-20	Piston Rings (3)
2-21	Ball Valve for Piston (7.96 mm)
2-22	Cylinder



Part No.	Part Name
3-1	O Ring
3-2	Injection Pipe
3-6	Depth Plate
3-9	Bolt for Depth Plate
3-10	Ball Valve for Nozzle (9.5 mm)
3-11	Nozzle Spring
3-12	Nozzle
3-13	Nozzle Tip

Attachment C – Spare Parts Kit for Kioritz Soil Injector

These are the standard parts that originally came in the spare parts kit for the Kioritz soil injector and are the ones that most frequently need replacing. The kit is no longer available for purchase, but SGH may have or be able to help you find appropriate substitute parts or arrange for your injector to be repaired for just the cost of the parts and return shipping.

2-9	Packing
2-20	Piston Ring (3)
2-21	Ball Valve
3-1	O Ring
3-10	Ball Valve
3-11	Spring



WARNING: The Kioritz injector was originally made in Japan, and all its parts are metric. Do not try to make your own substitutions with non-metric parts without first checking with the Hemlock Help Line for the specifications.