

Shepherd® Fungicide

MSDS (Material Safety Data Sheet)

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P.O. Box 34645 • Omaha, NE 68134 • Toll-Free: 800-698-4641 • Phone: 402-339-4459 • Fax: 402-339-5011 • www.ArborSystems.com

1. PRODUCT IDENTIFICATION

Product Name: Shepherd® Fungicide**Active Ingredient (%):** Propiconazole (14.3%)**CAS No.:** 60207-90-1**EPA Reg. No.:** 69117-3**EPA Est:** 69117-NE-1**EPA Signal Word:** Warning**Chemical Description:** 1-[[2-[(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-triazole**Chemical Class:** Triazole Derivative Fungicide

2. COMPOSITION/INFORMATION ON INGREDIENTS

Material	OSHA PEL	ACGIH TLV	Other	NTP/IARC/OSHA Carcinogen
Tetrahydrofurfuryl Alcohol (THFA)	Not established	Not established	2 ppm (TWA)****	No
Propiconazole (14.3%)	Not established	Not established	10 mg/m ³ TWA ***	No

*** Occupational Exposure Limit (OEL)

**** Recommended by AIHA (American Industrial Hygiene Association)

Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.

Hazard Category: B

3. HAZARDS IDENTIFICATION

Symptoms of Acute Exposure: May cause eye irritation.

Exposure to high vapor levels may cause headache, dizziness, numbness, nausea, incoordination, or other central nervous system effects.

Hazardous Decomposition Products: Can decompose at high temperatures forming toxic gases.**Physical Properties:****Appearance:** Clear blue liquid**Odor:** Aromatic solvent**Unusual Fire, Explosion and Reactivity Hazards:** Combustible liquid. Can release vapors that form explosive mixtures at temperatures at or above the flash point. Heavy vapors can flow along surfaces to distant ignition sources and flash back.

During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.

4. FIRST AID MEASURES

Have the product container, label, or Material Safety Data Sheet with you when calling a poison control center or doctor, or going for treatment.**If in Eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.**If on Skin or Clothing:** Take off contaminated clothing. Immediately rinse skin with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.**If Swallowed:** Immediately call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.**If Inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by

mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

5. FIRE FIGHTING MEASURES

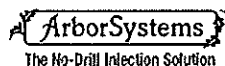
Fire and Explosion:**Flash Point (Test Method):** 181°F (Setaflash)**Flammable Limits (% in Air):****Lower:** % Not applicable**Upper:** % Not applicable**Autoignition Temperature:** Not available**Flammability:** Combustible liquid**Unusual Fire, Explosion and Reactivity Hazards:** Combustible liquid. Can release vapors that form explosive mixtures at temperatures at or above the flash point. Heavy vapors can flow along surfaces to distant ignition sources and flash back.

During a fire, irritating and possibly toxic gases may be generated by thermal decomposition or combustion.

In Case of Fire: Use appropriate extinguishing media for combustibles in the area. Wear full protective clothing and self-contained breathing apparatus. Evacuate nonessential personnel from the area to prevent human exposure to fire, smoke, fumes or products of combustion. Prevent use of contaminated buildings, area, and equipment until decontaminated. Water runoff can cause environmental damage. If water is used to fight fire, dike and collect runoff.

6. ACCIDENTAL RELEASE MEASURES

In Case of Spill or Leak: Control the spill at its source. Contain the spill to prevent from spreading or contaminating soil or from entering sewage and drainage systems or any body of water. Clean up spills immediately, observing precautions outlined in Section 8. Cover entire spill with absorbing material and place into compatible disposal container. Scrub area with hard water detergent (e.g. commercial products such as Tide, Joy, Spic and Span). Pick up wash liquid with additional absorbent and place into compatible disposal container. Once all material is cleaned up and placed in a disposal container, seal container and arrange for disposition.



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7. HANDLING AND STORAGE

Store the material in a well-ventilated, secure area out of reach of children and domestic animals. Do not store food, beverages, or tobacco products in the storage area. Prevent eating, drinking, tobacco use, and cosmetic application in areas where there is a potential for exposure to the material. Wash thoroughly with soap and water after handling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

THE FOLLOWING RECOMMENDATIONS FOR EXPOSURE CONTROLS/PERSONAL PROTECTION ARE INTENDED FOR THE MANUFACTURE, FORMULATION, PACKAGING, AND USE OF THIS PRODUCT.

FOR COMMERCIAL APPLICATIONS AND/OR ON-FARM APPLICATIONS, CONSULT THE PRODUCT LABEL.

Ingestion: Prevent eating, drinking, tobacco usage, and cosmetic application in areas where there is a potential for exposure to the material. Wash thoroughly with soap and water after handling.

Eye Contact: Where eye contact is likely, use chemical splash goggles. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Skin Contact: Where contact is likely, wear chemical-resistant (such as nitrile or butyl) gloves, coveralls, socks, and chemical-resistant footwear. For overhead exposure, wear chemical-resistant headgear.

Inhalation: Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below exposure limits. A NIOSH-certified combination air-purifying respirator with an N, P, or R 95 or HE class filter and an organic vapor cartridge may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a pressure demand atmosphere-supplying respirator if there is any potential for uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear blue liquid

Odor: Aromatic solvent

Melting Point: Not applicable

Boiling Point: Not available

Specific Gravity/Density: 1.09 g/cm³

pH: 4–7 (10% solution in H₂O)

Solubility in H₂O: Propiconazole: 0.1 g/l @ 68°F (20°C)

Vapor Pressure: Propiconazole: 4.2 x 10⁻⁷ mmHg @ 77°F (25°C)

10. STABILITY AND REACTIVITY

Stability: Stable under normal use and storage conditions

Hazardous Polymerization: Will not occur

Conditions to Avoid: Flame, heat, ignition sources

Materials to Avoid: Strong oxidizers

Hazardous Decomposition Products: Can decompose at high temperatures forming toxic gases

11. TOXICOLOGICAL INFORMATION

Acute Toxicity/Irritation Studies (Finished Product)

Ingestion: Slightly Toxic

Oral (LD50 Rat): 4,340 mg/kg body weight

Dermal: Slightly Toxic

Dermal (LD50 Rabbit): > 2,020 mg/kg body weight

Inhalation: Slightly Toxic

Inhalation (LC50 Rat): > 2.6 mg/l air – 4 hours

Eye Contact: Moderately irritating (Rabbit)

Skin Contact: Non-irritating (Rabbit)

Skin Sensitization: Not a sensitizer (Guinea Pig)

Reproductive/Developmental Effects

Propiconazole: None observed

Chronic/Subchronic Toxicity Studies

Propiconazole: None observed

Carcinogenicity

Propiconazole: Increased incidence of liver tumors at extremely high doses (male mice).

Other Toxicity Information: None

Toxicity of Other Components:

Tetrahydrofurfuryl Alcohol (THFA): Inhalation of vapors at high concentrations can cause central nervous system effects (dizziness, headache), irritation to eyes or respiratory tract. Chronic overexposure may affect the kidney.

Target Organs:

Active Ingredients: Propiconazole: Liver

Inert Ingredients: Tetrahydrofurfuryl Alcohol (THFA): CNS, Kidney

12. ECOLOGICAL INFORMATION

Summary of Effects:

Propiconazole: Moderately toxic to fish and invertebrates. Practically non-toxic to birds and bees.

Eco-Acute Toxicity:

Propiconazole:

Bees LC50/EC50 > 25 ug/bee

Invertebrates (Water Flea) LC50/EC50 3.2 – 10.2 ppm

Fish (Trout) LC50/EC50 4.3 ppm

Fish (Bluegill) LC50/EC50 5.7 – 6.4 ppm

Bird (8-day dietary – Bobwhite Quail) LC50/EC50 > 5,620 ppm

Bird (8-day dietary – Mallard Duck) LC50/EC50 > 5,620 ppm

Eco-Chronic Toxicity:

Propiconazole:

Fish (Fathead minnow) Early Life Stage MATC > 0.43 and < 0.97 mg/l

Invertebrate (Daphnia Magna) Life Cycle MATC > 0.31 and < 0.69 mg/l

Mallard Reproduction NOEC 300 ppm

Bobwhite Reproduction NOEC 1,000 ppm



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Environmental Fate:**Propiconazole:**

The information presented here is for the active ingredient, Propiconazole.

Low bioaccumulation potential. Not persistent in soil. Stable in water. Low mobility in soil. Sinks in water (after 24 h).

13. DISPOSAL CONSIDERATIONS

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a tightly closed container in a cool, dry place.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Completely empty pack into application equipment, then dispose of empty pack in a sanitary landfill or by incineration, or if allowed by State and local authorities, by burning; if burned, stay out of smoke.

14. TRANSPORT INFORMATION

This product is shipped in inner packaging not over 4 L (1.0 Gallon) each and is therefore shipped under the "Limited quantities of Division 6.1 materials" exception, 49 CFR 173.153(b).

15. REGULATORY INFORMATION**EPCRA SARA Title III Classification:****Section 311/312 Hazard Classes:**

Acute Health Hazard

Fire Hazard

Section 313 Toxic Chemicals: Propiconazole (14.3%)

(CAS No. 60207-90-1)

California Proposition 65: Not applicable

CERCLA/SARA 302 Reportable Quantity (RQ): None

RCRA Hazardous Waste Classification (40 CFR 261): Not applicable

TSCA Status: Exempt from TSCA, subject to FIFRA

16. OTHER INFORMATION

NFPA Hazard Ratings		HMIS Hazard Ratings		Rating Key
Health:	2	Health:	1	0 = Minimal
Flammability:	2	Flammability:	2	1 = Slight
Instability:	0	Reactivity:	0	2 = Moderate
				3 = Serious
				4 = Extreme

Revision: 12/09

Supersedes: 03/01, 04/04, 05/08 and 11/08 versions

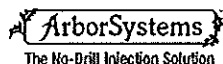
The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. It is the responsibility of the user to comply with all laws and procedures applicable to the safe handling, storage, and use of this product and to determine the suitability of the product for its intended use. IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.

Shepherd® is a registered trademark of ArborSystems.

Shepherd® Fungicide

Specimen Label

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An ArborSystems™ Direct-Inject™ Chemical

For systemic fungicide suppression of selected diseases in trees.

For use by professional arborists/applicators with the ArborSystems Direct-Inject Tree Injection System. To be used only with the ArborSystems Direct-Inject Tree Injection System.

ACTIVE INGREDIENT:

Propiconazole (CAS No. 60207-90-1) 14.3%

OTHER INGREDIENTS 85.7%

Total: 100.0%

Container Size	Net Contents	AI/Container
120 ml pack	4 fl oz (120 ml)	0.5 oz (14 g)
1000 ml pack	1 qt 2 fl oz (1000 ml)	4.2 oz (116.7 g)

EPA Reg. No. 69117-3 EPA Est. 69117-NE-1

Keep Out of Reach of Children

WARNING

See below for additional precautionary statements and complete Directions for Use.

PRECAUTIONARY STATEMENTS

Hazards to Humans & Domestic Animals

WARNING: Causes substantial but temporary eye injury. Wear goggles or face shield. Causes skin irritation. Do not get in eyes, on skin, or on clothing. Harmful if swallowed, inhaled, or absorbed through skin. Avoid breathing vapor. Wear rubber or neoprene gloves when handling this product. Thoroughly wash with soap and water after handling. Remove and wash contaminated clothing before reuse.

FIRST AID

Have the product container, label, or Material Safety Data Sheet with you when calling a poison control center or doctor, or going for treatment.

If in Eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on Skin or Clothing: Take off contaminated clothing. Immediately rinse skin with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If Swallowed: Immediately call a poison control center or doctor for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

If Inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

Notes to Physician: If ingested, lavage stomach to avoid aspiration. A slurry of activated charcoal in water can be left in the stomach. Give a saline laxative and supportive therapy.

ENVIRONMENTAL HAZARDS

This product is toxic to fish. Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash waters.

PHYSICAL OR CHEMICAL HAZARDS

Do not use or store near heat or open flame.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its label.

GENERAL INFORMATION

ARBORSYSTEMS DIRECT-INJECT TREE INJECTION SYSTEM

The ArborSystems Direct-Inject Tree Injection System is easy to use. Most trees are treated in as little as five minutes or less with no drilling required. Chemical is injected into the cambial area of the tree (the active vascular system). There is no need to wait for absorption (translocation). Because the chemical is placed right where the tree can use it, effectiveness of the chemical is increased. Use in sunny or over-cast conditions, rainy or dry, at any time of day. As no drilling or implants are required, you can treat trees year after year, with no threat of long-term or permanent damage to the tree. Direct-Inject Systems minimize wounding and promote long-term tree vigor.

TREATMENT INFORMATION

Oak trees exhibiting less than 20% crown loss from Oak Wilt will have the best chance of responding to treatment with Shepherd Fungicide. Preventive application is more effective than therapeutic treatment in trees showing disease symptoms. Trees in advanced stages of disease development may not respond to treatment.

Trees exhibiting specific symptoms, or symptomless trees immediately adjacent to a diseased tree, should be considered infected. Symptomless trees separated by a primary plow line from diseased trees may be at less risk of infection. Do not use on sick plants or plants weakened by extreme environmental conditions such as heat, flooding, cold, etc.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Use protective eyewear and gloves when handling ArborSystems Direct-Inject chemicals. Use chemical-resistant gloves made of any waterproof material such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton.



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PREVENTION AND TREATMENT

Shepherd Fungicide is a systemic fungicide for use as an injection for prevention and treatment of:

- 1) Oak Wilt (*Ceratocystis fagacearum*) of Oak (*Quercus* spp.)
- 2) Dutch Elm disease (*Ceratocystis ulmi*) of Elms (*Ulmus* spp.)
- 3) Sycamore Anthracnose (*Apiognomonia veneta*)
- 4) Leaf diseases (i.e., *Venturia inaequalis*, *Gymnosporangium juniperi-virginianae*, *Pucciniastrum goeppertianum*, etc.) of Crabapple (*Malus* spp.)

These fungi infect the vascular system and cause plugging throughout the tree. It is recommended that Shepherd Fungicide be administered by trained arborists or others trained in injection techniques and in the identification of Oak Wilt and Dutch Elm disease. When possible, Shepherd Fungicide should be injected into flare roots to ensure even distribution throughout the tree.

DOSAGE

For treatment of Oak Wilt disease for an uninfected Live Oak (not including Red Oak), 3-5 ml per injection site.

For treatment of Dutch Elm disease for an uninfected Elm or Oak other than Live Oak, 5-10 ml per injection site.

For treatment of leaf diseases in Crabapple, 1-2 ml per injection site. (Do not use fruit from treated trees for food or feed purposes.)

For treatment of Anthracnose in Sycamore, 1-2 ml per injection site.

Note: The number of injection sites is based on 1 injection for every 3" to 5" of trunk circumference.

RETREATMENT

Record the level of disease in each tree prior to initial Shepherd Fungicide injection. Consider preventative applications 12 months after the initial injection. Reevaluate the disease level in all trees, particularly those in high disease risk areas or high-value trees, for possible retreatment 12 months after each treatment and/or on an annual basis.

NOTES

1. Accurate diagnosis of Oak Wilt and Dutch Elm disease is important since Shepherd Fungicide provides only suppression of the diseases listed on the label.
2. Shepherd Fungicide will be most effective when used in conjunction with other cultural practices recommended for management of Oak Wilt and Dutch Elm disease (removal of dead elm trees, pruning of diseased tree limbs and branches, control of bark beetles, etc.).
3. If it is difficult to keep all of the chemical in the site, mark this site and move on to the others. When finished moving around to the trees, return to the marked tree and add the required amount of chemical needed.

HOW TO USE ARBORSYSTEMS DIRECT-INJECT CHEMICALS WITH ARBORSYSTEMS DIRECT-INJECT UNITS

1. Use only ArborSystems Direct-Inject chemicals with your unit as they have been formulated specifically for the Direct-Inject systems. Use of other chemicals will invalidate warranty.
2. Attach the container to the Direct-Inject unit and prepare the unit to make injections.
3. Set the delivery volume on the unit.
4. Follow the label directions to determine the amount of chemical and number of injection sites.
5. Determine where to make injections in the bark. Generally, the injection tip is inserted into the fissure (valley) of the tree bark. Inject thin-barked trees in the thicker part of the tree bark. Thick-barked trees require a longer injection tip.
6. Make injections working around the circumference of the tree. Make Wedgle® Tip injections within 12" of the ground. Portle® Tip injection height varies depending on type of tree and location.
7. With a smooth motion, firmly squeeze the injection unit handles. This releases a pre-measured chemical dose into the tree.
8. Continue making injections moving around the tree until the entire tree trunk has been treated.
9. During use, periodically clean the Direct-Inject unit to prevent clogging.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Storage: Store in a container in a cool, dry place.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: Completely empty pack into application equipment, then dispose of empty pack in a sanitary landfill or by incineration, or if allowed by State and local authorities, by burning; if burned, stay out of smoke.

NOTICE OF WARRANTY

ArborSystems warrants that this product conforms to the chemical description on the label and is reasonably fit for use under average conditions when used strictly in accordance with the directions on the labeling. ArborSystems does not make or authorize any agent or representative to make any other warranty, guarantee or representation, express or implied, concerning this product.

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ArborSystems™, Direct-Inject™, and WedgeChek™ are trademarks of ArborSystems.

Direct Inject™ unit is 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 #7,178,286