

# ARBORJET POCKET GUIDE

## TOP 30 TREATABLE TREES



A GUIDE TO COMMON INSECTS, DISEASES  
AND THEIR TREATMENTS.

# TABLE OF CONTENTS

PAGE	CONTENT	DESCRIPTION
2	About Arborjet	Who is Arborjet, and what do we do?
3	The Right Tool for the Job	Choosing equipment options and number of plugs
4	The Proper Arborplug Placement	Guidelines to determine the number of plugs to use
5	Arborjet Injection Tips	Tips on how to use Arborjet's products effectively
6	Arborjet Formulations and Equipment	Arborjet's injectable formulations & injection equipment
7 - 16	Tree Index and How to Use It	A quick reference guide to common trees, their common pests, and which Arborjet treatment to use
17 - 21	Insect & Disease Index and How to Use It	An index of all treatable insects and diseases, their common tree hosts, & the appropriate Arborjet treatment
22 - 38	Insect & Disease Detail Pages and How to Use Them	More information on your insect or disease, such as how and when to treat it
38	Contact and Ordering Information	Order products from Arborjet distributors or talk to a representative

This guide is color coded to help you find what you're looking for quickly. **For more information about all of our products, formulations, and services, visit our website [www.arborjet.com](http://www.arborjet.com), or call us at 781.935.9070.**

## ABOUT ARBORJET



Arborjet was designed by arborists for arborists in order to effectively manage and control the many exotic and native insect pests and diseases threatening our natural and urban forest today. Arborjet's first prototype was a modification of the needleless medical injection device used post World War II for mass inoculation. With spraying and soil drenching becoming more and more controversial, injection's time has come.

Arborjet is one of the few private enterprises in the world committed to the research and development of target specific treatment formulations designed exclusively for trunk injection.

Arborjet has its own fully staffed laboratory and field research team tirelessly devoted to the discovery and development of formulations that are the most effective available.



**PROVEN • FAST • EFFECTIVE**

# THE RIGHT TOOL FOR THE JOB: CHOOSING THE RIGHT EQUIPMENT

3

## TREE I.V. 2 PACK KIT

The TREE I.V. is our most versatile injection system, delivering formulations through a high volume, low pressure method. It's great for coniferous and hardwood trees that take a little extra time in uptake. We recommend the TREE I.V. as the ideal starter kit.



## F 12 KIT

The next generation of TREE I.V. Inject trees like never before with first 120 psi micro-infusion system. Big tree or small, 2 bottle sizes give you flexibility on the job. An easy fill cap allows you to add product without removing the bottle, making it safe and the state of the art.



## QUIK-JET KIT

The QUIK-jet is a cost-effective tool designed for lower dose applications. It can also be used as a diagnostic tool for someone just getting into trunk injection and a great complementary tool to the TREE I.V. The QUIK-jet is great for someone treating palms or smaller trees with only a few injection sites required.



## QUIK-JET AIR KIT

The QUIK-jet AIR features one-thumb switch operation, precise dose measuring, and air-powered injection in a rugged aluminum body weighing less than 2 pounds. You'll notice the difference when you make the switch and use QUIK-jet AIR.

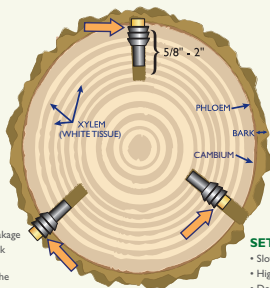




# PROPER ARBORPLUG® PLACEMENT

## SET CORRECTLY

- Fastest rate of uptake
- Least chance of leakage
- Best protection of the cambium
- Fastest wound closure (growth over the Arborplug)



## SET TOO SHALLOWLY

- Highest chance of leakage
- Higher chance of bark splitting
- Least protection of the cambium
- Slower wound closure (pushes the Arborplug out)

## SET TOO DEEPLY

- Slowest rate of uptake
- Higher chance of leakage
- Deeper wound than necessary

## SETTING ARBORPLUGS

*Below are guidelines to determine the number of plugs to use:*

- While using the TREE I.V. or FSeries (DBH/3)
- While using the QUIK-jet® or QUIK-jet AIR® (DBH/2)
- Optimal plug locations selected within 18" of soil line
- Choose healthy tissue, avoid damaged bark and/or compression wood or flat spots if possible.

## ARBORJET INJECTION STEPS

### 1. DRILL

Drill 5/8" - 2" deep into tree xylem (white tissue). \* Drill hole perpendicularly, (straight in) not on an angle.

### 2. PLUG

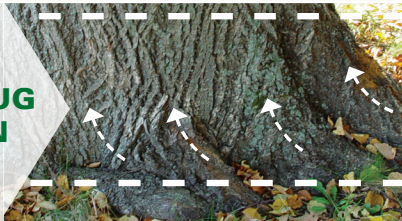
Insert and set Arborplug with set tool. The Arborplug surface should be just into the xylem.

### 3. INJECT

Insert needle and inject.

\* 9/32" bit for #3 Arborplugs or 3/8" bit for #4 Arborplugs

## BEST ARBORPLUG INJECTION ZONES



## ARBORJET INJECTION TIPS

- **Caution!** Do not mix any product with water or any other product unless specified on the product label.
  - Injection times will be fastest in the Spring and Fall when trees are in leaf and moisture conditions are cool and wet.
  - Proper Arborplug® setting is essential for delivery speed, effectiveness, wound protection, and closure.
  - Clean your equipment daily with CLEAN-jet. It lubricates and stops build-up of scale and precipitates.
  - When selecting Arborplug® locations, avoid flat spots, dead tissue, wounds or other damaged areas where internal vessels may be compromised.
- Poor or incomplete uptake could be an indication of serious decline, poor treatment conditions or other disease or infestation issues.
  - Avoid exposing formulations and equipment to extreme temperatures, under 40° F and above 90° F.
  - Use a sharp drill bit and drill to proper depth, using a single, straight, smooth motion.
  - When using the QUIK-jet® apply only a moderate amount of pressure. Applying heavier pressure may cause hand soreness and will not likely speed up your injection.

## FORMULATIONS AND EQUIPMENT

Arborjet's internationally recognized formulations are known for their ability to work with the tree's vascular system to achieve exceptional results.



**We carry a complete line of formulations, from insect and disease control to nutritional supplements.**

- TREE-äge® Insecticide
- TREE-äge® G4
- IMA-jet Insecticide
- ACE-jet Insecticide
- AzaSol™ Insecticide
- PHOSPHO-jet Fungicide
- Propizol® Fungicide
- Mn-jet Fe
- PALM-jet Nutrition
- Eco-1™ Garden Spray
- NutriRoot®
- Arbor-OTC® Antibiotic

# HOW TO USE YOUR TREE INDEX

## TREE INDEX

Name and picture of tree, listed in alphabetical order. If you already know the insect or disease, and you are looking only to treat it, refer to the Insect and Disease Index for quick treatment solutions.



## INSECTS & DISEASES

Most common treatable insects and diseases that are found in this tree. For a complete listing of treatable insects and diseases, refer to the Insect and Disease Index.



## PAGE

Page numbers refer to pictures and descriptions of your pest to help you identify and treat your problem.



## TREATMENT

The Arborjet treatment that is recommended for your insect or disease. To be used with either the QUIK-jet or TREE I.V. injection systems.



## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

APPLE



Apple Scab

24

PHOSPHO-jet

Bagworm

24

AzaSol™, ACE-jet

Fall Webworm

29

AzaSol, ACE-jet

Fireblight

30

PHOSPHO-jet, Arbor-OTC®, TREE-äge®, TREE-äge® G4\*

Japanese Beetle

31

ACE-jet, AzaSol

Plant Bug

ACE-jet, AzaSol

Tent Caterpillar

27

ACE-jet, AzaSol

Winter Moth

38

ACE-jet, AzaSol, TREE-äge®, TREE-äge G4\*

*\*Arbor-OTC only for use on ornamental plants.*

## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

ASH



Anthracnose	23	PHOSPHO-jet, ACE-jet, AzaSol™
Aphids	23	IMA-jet, ACE-jet, AzaSol
Ash Yellows		Arbor-OTC®
Clearwing Borers	28	TREE-äge®, TREE-äge® G4, ACE-jet, AzaSol
Emerald Ash Borer	29	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet
Lace Bugs		IMA-jet, ACE-jet
Whitefly		IMA-jet, AzaSol, ACE-jet
Winter Moth	38	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

BEECH



Anthracnose	23	PHOSPHO-jet
Leaf Miner	32	IMA-jet, TREE-äge®, TREE-äge G4, ACE-jet, AzaSol
Stem Canker	26	PHOSPHO-jet

BIRCH



Anthracnose	23	PHOSPHO-jet
Bronze Birch Borer (Flathead Borer)	25	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet, AzaSol
Chlorosis	27	Mn-jet Fe
Fall Webworm	29	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Japanese Beetle	31	IMA-jet, ACE-jet, AzaSol
Leaf Miner	32	TREE-äge, TREE-äge G4, ACE-jet, IMA-jet, AzaSol
Stem Cankers	26	PHOSPHO-jet
Tent Caterpillar	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

# TREE INDEX

# INSECTS & DISEASES

# PAGE

# TREATMENT

9

CHERRY



Cankerworm	26	ACE-jet, AzaSol™
Fall Webworm	29	TREE-äge®, TREE-äge® G4*, ACE-jet, AzaSol
Japanese Beetle	31	ACE-jet, AzaSol
Leaf Miner	32	ACE-jet, IMA-jet, AzaSol
Oak Looper (Caterpillar)	27	ACE-jet, AzaSol
Phytophthora (Root Rot)	34	PHOSPHO-jet
Tent Caterpillar	27	ACE-jet, AzaSol
Winter Moth	38	ACE-jet, AzaSol

CITRUS



Aphids	23	ACE-jet*, IMA-jet* or AzaSol
Scale (soft)		IMA-jet*, AzaSol
Scale (hard)		ACE-jet*, AzaSol
Iron Chlorosis		Mn-jet Fe*
Root Rot		PHOSPHO-jet

CRAB APPLE



Apple Scab	24	PHOSPHO-jet, Propizol®, Arbor-OTC®*
Bagworm	24	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Fall Webworm	29	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Fireblight	30	PHOSPHO-jet, Arbor-OTC*
Japanese Beetle	31	ACE-jet, AzaSol, IMA-jet*
Plant Bug		ACE-jet, AzaSol
Tent Caterpillar	27	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Winter Moth	38	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol

*\*For ornamental use only. Fruit are not to be used for human or animal consumption.*

## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

### DOGWOOD



Anthrachnose	23	PHOSPHO-jet
Dogwood Borer (Clearwing Borer)	28	TREE-äge®, TREE-äge® G4, ACE-jet, AzaSol™
Dogwood Phytophthora (Root Rot)	34	PHOSPHO-jet
Gall Midge		ACE-jet
Scale (soft)	36	IMA-jet, AzaSol
Scale (hard)	36	ACE-jet, AzaSol
Thrips	37	ACE-jet, IMA-jet, AzaSol

### ELM



Dutch Elm Disease	28	Propizol®
Cankerworm	26	ACE-jet, AzaSol
Carpenterworm (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Gall Midge		ACE-jet
Leaf Beetle		ACE-jet, IMA-jet, AzaSol
Leaf Miner	32	TREE-äge, TREE-äge G4, ACE-jet, IMA-jet, AzaSol
Spanworm (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Stem Canker	26	PHOSPHO-jet

### EUCALYPTUS



Red Gum Lerp Psyllid		IMA-jet
Eucalyptus Londhorned Beetle	26	IMA-jet

# TREE INDEX

# INSECTS & DISEASES

# PAGE

# TREATMENT

## FIR



Budworm

25

ACE-jet, AzaSol™, TREE-äge®, TREE-äge®G4  
(*Western Spruce Budworm only*)

Fir Tussock Moth (Caterpillar)

27

TREE-äge, TREE-äge® G4, ACE-jet, AzaSol

Pine Coneworm (Caterpillar)

27

TREE-äge, TREE-äge G4, ACE-jet, AzaSol

Western Spruce Budworm

25

TREE-äge, TREE-äge G4, ACE-jet, AzaSol

White Pine Weevil

ACE-jet, AzaSol

## HAWTHORN



Apple Scab

24

PHOSPHO-jet, Arbor-OTC®

Black Spot

PHOSPHO-jet, Arbor-OTC

Fireblight

30

PHOSPHO-jet, Arbor-OTC

Lace Bugs

IMA-jet, ACE-jet

Mealy Bugs

ACE-jet, IMA-jet, AzaSol

Phytophthora (Root Rot)

34

PHOSPHO-jet

Tent Caterpillar

27

TREE-äge, TREE-äge G4, ACE-jet, AzaSol

## HEMLOCK



Hemlock Elongate Scale

36

ACE-jet

Hemlock Woolly Adelgid

22

IMA-jet, ACE-jet

Phytophthora (Root Rot)

34

PHOSPHO-jet

Spider Mites

33

ACE-jet



## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

HICKORY



Cankerworm (Caterpillar)	26	TREE-äge®, TREE-äge® G4, ACE-jet, AzaSol™
Eastern Oak Looper (Caterpillar)	27	TREE-äge, TREE-äge® G4, ACE-jet, AzaSol
Gall Midges		ACE-jet
Tussock Moth (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

LINDEN



Anthraxnose	23	PHOSPHO-jet, Propizol®
Aphids	23	ACE-jet, IMA-jet, or AzaSol
Bagworm	24	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Japanese Beetle	31	IMA-jet, ACE-jet, AzaSol
Lace Bugs		ACE-jet, IMA-jet
Leaf Spot		Arbor-OTC®
Linden Looper (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Stem Canker	26	PHOSPHO-jet, Arbor-OTC

LOCUST



Bagworm	24	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Carpenterworm (Caterpillar)	27	ACE-jet, AzaSol
Calico Scale (armored)	36	ACE-jet, AzaSol
Gall Midge		ACE-jet
Leafhopper		ACE-jet or IMA-jet
Leaf Miner	32	TREE-äge, TREE-äge G4, ACE-jet, IMA-jet, AzaSol
Plant Bug		ACE-jet, AzaSol
Tussock Moth (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

# TREE INDEX

# INSECTS & DISEASES

# PAGE

# TREATMENT

# 13

## MAGNOLIA



Aphids		ACE-jet, IMA-jet, or AzaSol™
Cankers	26	Arbor-OTC®, PHOSPHO-jet
Leaf Spot		Arbor-OTC, PHOSPHO-jet
Magnolia Scale (armored)	36	ACE-jet, AzaSol

## MAPLE



Anthracnose	23	PHOSPHO-jet, Propizol®
Aphids	23	ACE-jet, IMA-jet, AzaSol
Bagworm	24	TREE-äge®, TREE-äge® G4, ACE-jet, AzaSol
Cankerworm (Caterpillar)	26	ACE-jet, AzaSol
Cottony Maple Scale (soft)	36	IMA-jet, AzaSol
Interveinal Chlorosis	27	Mn-jet Fe
Thrips	37	ACE-jet, IMA-jet, AzaSol
Winter Moth	38	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

## OAK



Anthracnose	23	PHOSPHO-jet
Bacterial Leaf Scorch		Arbor-OTC
Clearwing Borers		TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Gypsy Moth	31	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Interveinal Chlorosis	27	Mn-jet Fe
Oak Worm (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Oak Leaf Caterpillar	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Oak Wilt	33	Propizol
Sudden Oak Death		PHOSPHO-jet
Winter Moth	38	TREE-äge, TREE-äge G4, ACE-jet, AzaSol

## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

PALM



Aphids	23	ACE-jet, IMA-jet, AzaSol™
Black Diamond Scale		PHOSPHO-jet
Frizzle Top		PALM-jet
Lethal Yellows	25	Arbor-OTC®
Phytoplasma Disease		Arbor-OTC
Rugose Spiraling Whitefly	35	IMA-jet*, AzaSol
Texas Phoenix Palm Decline		Arbor-OTC

PEAR



Anthracnose	23	PHOSPHO-jet
Apple Scab	24	PHOSPHO-jet, Arbor-OTC*
Black Spot		PHOSPHO-jet, Arbor-OTC*
Stem Canker	26	PHOSPHO-jet, Arbor-OTC*
Fireblight	30	PHOSPHO-jet, Arbor-OTC*
Tent Caterpillar	27	ACE-jet, AzaSol, TREE-äge®, TREE-äge® G4*
Fall Webworm	29	ACE-jet, AzaSol, TREE-äge®, TREE-äge G4*




PINE



Bagworm	24	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Bark Beetles** (Certain Species)	34	TREE-äge, TREE-äge G4
Budworm	25	ACE-jet, AzaSol
Mites	33	ACE-jet
Pine Tip Moth (Caterpillar)	27	ACE-jet, AzaSol
Pine Coneworm (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Pine Needle Miner (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
Pine Wilt Nematode		TREE-äge, TREE-äge G4
Sawfly		TREE-äge, TREE-äge G4, ACE-jet, IMA-jet, AzaSol
Scale (hard)	36	ACE-jet, AzaSol
White Pine Weevil		ACE-jet, IMA-jet, AzaSol

*\*For use on ornamental plants only. Fruit not for human or animal consumption.*

*\*\*Bark Beetles on TREE-äge label include: Ips Engraver Beetle, Mountain Pine Beetle, Southern Pine Beetle, Spruce Beetle, Western Pine Beetle, Pine Cone Seed Bug, Pine Needle Scale*

TREE INDEX		INSECTS & DISEASES	PAGE	TREATMENT	15
POPLAR		Bagworm	24	TREE-äge®, TREE-äge®G4, ACE-jet, AzaSol™	
		Cottonwood Twig Borer		TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
		Japanese Beetle	31	ACE-jet, AzaSol	
		Poplar Tentmaker (Caterpillar)	27	ACE-jet, AzaSol	
		Stem Canker	26	Arbor-OTC®	
		Tent Caterpillar	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
SPRUCE		Bagworm	24	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
		Budworm	25	ACE-jet, AzaSol	
		Pine Coneworm (Caterpillar)	27	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
		Root Weevil		ACE-jet, AzaSol	
		Spruce Beetle		TREE-äge, TREE-äge G4	
		Spruce Gall Adelgid	22	ACE-jet, IMA-jet	
		Western Spruce Budworm	25	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
		White Pine Weevil		ACE-jet, AzaSol	
SYCAMORE		Anthraxnose	23	PHOSPHO-jet, Propizol®	
		Aphids	23	ACE-jet, IMA-jet, AzaSol	
		Bacterial Leaf Scorch		Arbor-OTC	
		Bagworm	24	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
		Lace Bugs		ACE-jet, IMA-jet	
		Scale (soft)	36	IMA-jet, AzaSol	
		Stem Canker	26	PHOSPHO-jet, Arbor-OTC	

## TREE INDEX

## INSECTS & DISEASES

## PAGE

## TREATMENT

### TULIP TREE



Aphids	23	ACE-jet, IMA-jet, AzaSol™
Scale (soft)	36	IMA-jet, AzaSol, ACE-jet
Scale (hard)	36	ACE-jet, AzaSol
Stem Canker	26	PHOSPHO-jet, Arbor-OTC®

### WALNUT



Anthracnose	23	PHOSPHO-jet
Aphids	23	ACE-jet, IMA-jet, AzaSol
Fall Webworm	29	TREE-äge®*, TREE-äge® G4*, ACE-jet, AzaSol
Phytophthora (Root Rot)	34	PHOSPHO-jet
Walnut Caterpillar	27	ACE-jet, AzaSol
Walnut Lace Bugs		ACE-jet, IMA-jet

### WILLOW



Carpenterworm (Caterpillar)	27	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Phytophthora (Root Rot)	34	PHOSPHO-jet
Poplar Tent Maker (Caterpillar)	27	ACE-jet, AzaSol
Tussock Moth (Caterpillar)	27	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Willow Leaf Beetle		ACE-jet, IMA-jet, AzaSol

*\*For ornamental use only. Fruit are not to be used for human or animal consumption.*

# HOW TO USE YOUR INSECT AND DISEASE INDEX

17

## INSECTS AND DISEASES

Name of insect or disease listed in alphabetical order. If you know the insect or disease, but not the tree, see our Tree Index for quick identification.



## PAGE

Pages refer to problems including a picture and detailed descriptions to help identify and treat your insect or disease.



## COMMON TREES

Listings of the most common host trees for insect or disease specified.



## TREATMENT

The Arborjet treatment that is recommended for your insect or disease. To be used with either the QUIK-jet or TREE I.V. Injection systems. (AzaSol™ may be sprayed)



TREE PESTS	PAGE	COMMON TREES	TREATMENT
Adelgids	22	Hemlock, Spruce, many other host species	ACE-jet, IMA-jet
Anthracnose	23	Ash, Maple, Beech, Birch, Elm, Linden, Oak, Willow, Dogwood	PHOSPHO-jet
Anthracnose	23	Sycamore	PHOSPHO-jet, Propizol®
Aphids	23	Ash, Oak, Maple, Willow, Fruit trees	ACE-jet, IMA-jet, AzaSol™
Apple Scab	24	Crabapples; Hawthorne, Ornamental Pear	PHOSPHO-jet, Arbor-OTC®, Propizol® ( <i>Propizol for crabapple only</i> )
Ash Yellow		Ash	Arbor-OTC
Asian Longhorned Beetle		Elm, Maple, Birch, Willow, Ash, Poplar, Sycamore	IMA-jet
Bacterial Leaf Scorch		Elm, Gum, Oak, Oleander, Sycamore	Arbor-OTC
Bagworm	24	Juniper, Arborvitae, Cedars, Pine, Hemlock, Spruce, Locust, Maple, Sycamore, Willow, Linden, Poplar.	TREE-äge®, TREE-äge®G4, ACE-jet, AzaSol
Birch Leaf Miner	32	Birches: White, Gray, Yellow, European, Cut-leaf	TREE-äge, TREE-ägeG4, IMA-jet, AzaSol
Black Spot		Crabapple, Hawthorne, Pear	PHOSPHO-jet
Black Vine Weevil		Many host species (see root weevils)	ACE-jet, IMA-jet, AzaSol™
Boxelder Bug		Boxelder, Ash, Maple, Fruit trees	ACE-jet, AzaSol

*\*For ornamental use only. Fruit are not to be used for human or animal consumption.*

TREE PESTS	PAGE	COMMON TREES	TREATMENT
Bronze Birch Borer (Flathead Borer)	25	Birches: White , Water, Paper, Yellow, Whitebarked, Himalayan, Gray, Sweet	TREE-äge®, TREE-äge® G4, IMA-jet, ACE-jet
Browntail Moth (Caterpillar)	27	Oak, Shadbush, Apple, Cherry, Beach Plum, Hawthorn	ACE-jet, AzaSol™
Budworms	25	Spruce, Fir, Fraser Fir, Tamarack, Pine, Hemlock	TREE-äge, TREE-äge G4, (Western Spruce Budworm Only), ACE-jet, AzaSol
Cankerworms	26	Red and White oaks, Maples, Elms, Hickories, Ash, and Cherry	ACE-jet, AzaSol
Carpenterworm (Caterpillar)	27	Red Oak, Black locust, Cottonwood, Elm, Maple, and Willow	ACE-jet, AzaSol
Casebearer (Caterpillar)	27	Elm, Pecan, Larch, Paper, Gray, White Birch	ACE-jet, AzaSol
Chlorosis	27	Oak, Birch, Maple	Mn-jet Fe
Citrus Collar Rot	25	Citrus spp.	PHOSPHO-jet
Citrus Longhorned Beetle (Roundheaded Borer)		Hardwood	TREE-äge, TREE-äge G4, IMA-jet
Citrus Root Rot	34	Citrus spp.	PHOSPHO-jet
Clearwing Borers	28	Ash, Linden, many other host species	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Coconut Bud Rot /Nut Fall		Coconut (Cocos nucifera)	PHOSPHO-jet
Cottonwood Twig Borer		Cottonwood, Poplar	ACE-jet, AzaSol
Dogwood Phytophthora (Root Rot)	34	Dogwood	PHOSPHO-jet
Dutch Elm Disease	28	Elms	Propizol®
Eastern Oak Looper (Caterpillar)	27	Red and White oaks, Maples, Elms, Hickories, Ash, and Cherry.	ACE-jet, AzaSol
Eastern Tent Caterpillar	27	Crabapple, Hawthorn, Maple	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol
Elm Leaf Beetle (larvae)		Elms	ACE-jet, IMA-jet, AzaSol™
Elm Spanworm (Caterpillar)	27	Elms	ACE-jet, AzaSol
Emerald Ash Borer	29	Ash	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet

*\*For ornamental use only. Fruit are not to be used for human or animal consumption.*

TREE PESTS	PAGE	COMMON TREES	TREATMENT	19
Eucalyptus Longhorned Borer (Roundheaded Borer)		Eucalyptus	TREE-äge®, TREE-äge® G4*, IMA-jet, AzaSol	
Fall Cankerworm	26	Red and White Oaks, Maples, Elms, Hickories, Ash	ACE-jet, AzaSol™	
Fall Webworm	29	Crabapple, Birch, Willow, Cottonwood	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
Fireblight	30	Crabapples, Hawthorne, Ornam. Pear, Ornam. Apple	PHOSPHO-jet, Arbor-OTC®	
Flathead Borers (Buprestid Borers)	28	Many Species	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet	
Forest Tent Caterpillar	27	Maples, Aspens, Oaks, Cottonwood, Elms, Willow, Birch, Linden, Ash	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol	
Frizzle Top		Palms	PALM-jet	
Gall Midges		Oak, Willow, Elm, Maple, Walnut, Hickory, Pine, Locust	ACE-jet	
Gypsy Moth	31	Many Oak Species, white preferred	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
Hemlock Woolly Adelgid	22	Hemlock	IMA-jet, ACE-jet	
Invasive Shot Hole Borer	31	Sycamore, Maples, Oak, Willow, Alders, Avocado and many more	TREE-age, TREE-äge G4, Propizol	
Japanese Beetle	31	Maple, Birch, Citrus, Walnut, Apple, Poplar, Oak, Sassafrass, Linden, Elm	IMA-jet, ACE-jet, AzaSol	
Lace Bugs		Sycamore, Oak, Hackberry, Basswood, Hawthorne, Crabapple, Mt. Ash, Shadbush	ACE-jet, IMA-jet	
Leaf Miners	32	Oak, Birch, Beech, Elm, Hawthorn, Holly, Locust	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet, AzaSol	
Leaf Spot Diseases		Crabapples, Apple, Birch, Linden, Magnolia, many other species	PHOSPHO-jet, Propizol®* ( <i>Propizol for crabapple only</i> ), Arbor-OTC	
Leafhoppers		Many Host Species	ACE-jet, IMA-jet	
Leafrollers		Many Host Species	ACE-jet, AzaSol	
Lethal Yellows		Palm	Arbor-OTC	
Linden Looper (Caterpillar)	27	Linden, Birch, Hickory, Ash, Elm, Cherry, Maple	ACE-jet, AzaSol	

*\*For ornamental use only. Fruit are not to be used for human or animal consumption.*



TREE PESTS	PAGE	COMMON TREES	TREATMENT
<b>Longhorned Borers</b> (Roundheaded Borers)		Many Host Species	TREE-äge®, TREE-äge G4®, IMA-jet, ACE-jet
<b>Mealy Bug</b>		Many Host Species	ACE-jet, IMA-jet, AzaSol
<b>Nantucket Pine Tip Moth (Caterpillar)</b>	27	Pines: Pitch, Virginia, Scotch, Shortleaf, Monterey, Loblolly	ACE-jet, AzaSol
<b>Oak Wilt</b>	33	Red & White Oaks	Propizol®
<b>Oak Worms (Caterpillar)</b>	27	Most Species Oaks	TREE-äge, TREE-äge G4, ACE-jet, AzaSol™
<b>Phytophthora (Root Rot)</b>	34	Tan Oak, Coast Live Oak, Black Oak, Crabapples, Hawthorn, Pear	PHOSPHO-jet
<b>Phytophthora Canker (Root Rot)</b>	34	Avocado	PHOSPHO-jet
<b>Pine Bark Beetles</b> ( <i>Bark Beetles included for TREE-äge: Ips Engraver Beetles, Mountain Pine Beetles, Southern Pine Beetle, Spruce Beetle, Western Pine Beetle</i> )	34	Pines: Loblolly, Lodgepole, Pinyon, Pitch, Ponderosa, Shortleaf, Slash, Virginia	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
<b>Pine Cone Worm (Caterpillar)</b>	27	Pines: Loblolly, Longleaf, Pond , Sand, Shortleaf, Slash, Virginia. Spruce, Douglas Fir, True Fir	TREE-äge, TREE-äge G4, ACE-jet, AzaSol
<b>Pine Needle Miner</b>		Pines: Pitch, Jack , Scotch , Virginia, Shortleaf, Longleaf, Table Mountain, Ponderosa, Lodgepole	ACE-jet, IMA-jet, TREE-äge, TREE-äge G4* AzaSol
<b>Pine Sawyer Beetle</b> (Roundheaded Borer)		Pines: Austrian, Scots	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet, AzaSol
<b>Pine Tip Moth (Caterpillar)</b>	27	Scotch, Muhgo, Ponderosa	ACE-jet, AzaSol, IMA-jet ( <i>larvae</i> )
<b>Plant Bugs (Lygus)</b>		Fruit Trees	ACE-jet, AzaSol
<b>Poplar Tentmaker (Caterpillar)</b>	27	Poplar, Willow	ACE-jet, AzaSol
<b>Psyllids</b>		Many Host Species	IMA-jet, AzaSol
<b>Red Oak Borer</b>		Red Oaks	ACE-jet, AzaSol
<b>Root and Collar Rot</b>	34	Stone Fruits; Cherries, Peaches, Plums	PHOSPHO-jet
<b>Root Rots</b>	34	Cedars, Chamaecyparis, Firs, Hemlock	PHOSPHO-jet
<b>Root Weevil (adults)</b>		Hemlock, Spruce, Arborvitae, Oaks, Magnolia, Sassafras, Yellow Poplar	ACE-jet, AzaSol™
<b>Royal Palm Bugs</b>		Cuban Royal Palms	IMA-jet, ACE-jet, AzaSol

Tree Pests	Page	Common Trees	Treatment	21
Rugose Spiraling Whitefly	35	Palms, Mango, Avocado, Gumbo Limbo, ornamental plants and shrubs	IMA-jet, AzaSol <i>(food-bearing plants)</i>	
Sawfly Larvae		Many Host Species	TREE-äge®, TREE-äge® G4, ACE-jet, AzaSol™, IMA-jet	
Scale Insects (Hard)	36	Many Host Species	ACE-jet, AzaSol	
Scale Insects (Soft)	36	Many Host Species	IMA-jet, AzaSol	
Spider Mites	33	Conifers	ACE-jet	
Spring Cankerworm	26	Oak, Elm	ACE-jet, AzaSol	
Stem Cankers	26	Ash, Maple, Beech, Birch, Elm, Linden, Oak, Sycamore, Willow, Cedars, Chamaecyparis, Firs, Hemlock, Junipers and Pine spp.	PHOSPHO-jet, Arbor-OTC®	
Sudden Oak Death	33	Oak spp.	PHOSPHO-jet	
Texas Phoenix Palm Decline		Canary Island date, Edible date, Wild date, Queen Palm, Sylvester and Cabbage palm	Arbor-OTC, IMA-jet	
Thrips	37	Dogwood, Magnolia, Maple, Palm, Viburnum,	IMA-jet, ACE-jet, AzaSol	
Tussock Moth (Caterpillar)	27	Many Host Species	TREE-äge, TREE-äge G4, ACE-jet, AzaSol	
Two Lined Chestnut Borer (Flatheaded Borer)	37	Oaks, American Chestnut	TREE-äge, TREE-äge G4, IMA-jet, ACE-jet	
Variable Oakleaf Caterpillar	27	White Oak, Oak	ACE-jet, AzaSol	
White Pine Weevil		Pines: White, Lodgepole, Red, Jack, Scots. Spruce: Black, Norway, Red, Colorado Blue. Douglas-fir	ACE-jet, AzaSol	
Whiteflies		Ash, Red Bud, Bradford Pear, Oak, Chestnut, Citrus	IMA-jet, AzaSol	
Whitemarked Tussock Moth (Caterpillar)	27	Pecan, Hickory, Walnut, Oak, Willow, Honey Locust	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol	
Willow Leaf Beetle (larvae)		White & Black Willow preferred	ACE-jet, IMA-jet, AzaSol	
Winter Moth	38	Oaks, Maples, Basswood, Ash, Crabapples, Certain Spruces	TREE-äge*, TREE-äge G4*, ACE-jet, AzaSol	
Yellownecked Caterpillar	27	Birch, Elm, Oak, Maple, Crabapple	ACE-jet, AzaSol	
Zimmerman Pine Moths (Caterpillar)	27	Austrian, Scotch, Ponderosa Pine	ACE-jet, AzaSol	

# HOW TO USE YOUR INSECT AND DISEASE DETAIL PAGES

## INSECT AND DISEASE

Name and picture of treatable insect and diseases, listed in alphabetical order.



## DESCRIPTION AND TREATMENT

A detailed description about the insect or disease. This includes:

- Common symptoms
- How to treat and when to treat
- Which Arborjet products to treat with



## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

ADELGIDS



Adelgids are very small, piercing-sucking insects which feed on conifers. Some species, like the Spruce Gall Adelgid, produce galls while others, like the Hemlock Woolly Adelgid, produce woolly masses or wax on the twigs at the base of the needles. Adelgids pierce the plant tissues and extract vital nutrients away from the plant.

Hemlock Woolly Adelgid damage begins with gradual fading and browning of limbs, often starting at the tips and progressing down the limb, until the limb eventually dies. Hemlock Woolly Adelgid infestation is characterized by the telltale whitish woolly masses on the twigs at the bases of the needles. With gall-producing species, the twigs and branch tips where the galls have formed will brown and die.

**Trees with Adelgids can be treated with: IMA-jet or ACE-jet.**

## ANTHRACNOSE

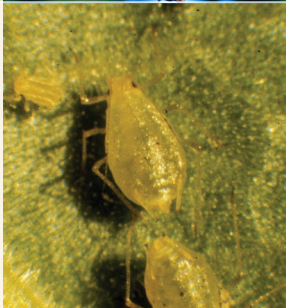


Anthrachnose (Leaf Blight) is a fungal disease that includes many species of fungi and affects many species of trees including ash, dogwood, maple, beech, birch, elm, linden, oak, sycamore and willow.

Visible symptoms of the disease vary with species and host but most commonly, infected leaves develop tan to reddish brown lesions that extend along the veins of the leaf.

**Trees with Anthracnose can be treated with: Propizol® Fungicide (Sycamore only) or PHOSPHO-jet.**

## APHIDS



Aphids are piercing-sucking insects which include a vast number of species. They have various shapes, colors and sizes, but are usually small, soft-bodied and pear-shaped with long, thin legs. Aphids often are found feeding in large groups and are slow-moving. They excrete a sticky substance called "honeydew" which will often cover objects below an aphid-infested tree.

Aphids do damage when populations become very high, at which point leaves will become curled, distorted and/or yellow. Growth will be stunted and honeydew will be excreted on objects below the tree.

**Trees with Aphids can be treated with: ACE-jet, IMA-jet or AzaSol™.**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

### APPLE SCAB



Apple Scab is a fungal disease which can affect the leaves, fruit, and twigs of apple, crabapple, hawthorn and pear. It is a common occurrence after a particularly wet and cool spring.

The evidence of Apple Scab is brownish-green spots on the leaves or fruit. As the infection progresses, the spots become darker and more prominent and take on a somewhat fuzzy texture. When infection is severe, leaves will drop off and fruit will be deformed and/or drop off prior to ripening.

**Trees with Apple Scab can be treated with: Propizol® Fungicide (Crabapples only) or PHOSPHO-jet.**

*\*Propizol is for ornamental use only. Fruit are not to be used for human or animal consumption.*

### BAGWORM



Bagworm is a caterpillar distinguishable by the “bags” they create around themselves out of silk and bits of leaves and bark. The caterpillar can be brown, tan or speckled and the “bag” can be 1-2 inches long. It can attack many trees, but prefers conifers.

Bagworms most often attack the new buds on conifers causing branch dieback. On hardwood trees, the larvae tend to feed on the top of the leaf, skeletonizing it. In either case, the clearest evidence of Bagworm infestation will be the presence of the Bagworm and their distinctive bags.

**Trees with Bagworm can be treated with: TREE-äge®, TREE-äge®G4, ACE-jet or AzaSol™.**

## BRONZE BIRCH BORER

(FLATHEADED BORER)



Bronze Birch Borer is a wood-boring beetle, common across the northern half of the United States, which attacks all birch species. The adult is a copper/bronze colored slender beetle. The larva, which does the damage, is unseen, feeding on the vascular tissue under the bark.

The Bronze Birch Borer typically attacks trees which are already stressed or in decline. A birch infested with Bronze Birch Borer will start showing dieback in the crown, which will increase in severity as the infestation continues, often leading to death of the tree. In later stages of infestation, the trunk will show D-shaped, rust-stained exit holes and may also have swollen extrusions under the bark where the tree tried to grow over larval galleries.

**Trees with Bronze Birch Borer can be treated with: TREE-äge®, TREE-äge® G4, IMA-jet, or AzaSol™.**

## BUDWORM



Budworm is found in the northern and northeastern states of the US. It feeds on Balsam Fir and Spruce, but can also be found on Tamarack, Pine, and Hemlock. The Budworm moth larvae, which do all the damage, are 2 millimeters long at hatching and a little more than 2 centimeters long prior to pupating. The early stage larva is a yellowish, pale green with a light brown head. The mature larva is brown with light colored spots along the back.

Initial damage often appears in the crown of the tree and appears as defoliation of branch tips and browning foliage. Other visible evidence could be the presence of the larvae spinning down on silken threads, or the presence of the small tents formed by late instars of the Budworm larvae. Death of the tree can occur after only one or two years of heavy infestation.

**Trees with Budworm can be treated with: TREE-äge®, TREE-äge® G4 (Western Spruce Budworm only), ACE-jet or AzaSol™.**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

### CANKERS



Cankers are lesions in the trunk or branch often caused by mechanical wounding and/or fungal and bacterial pathogens. Canker-causing pathogens are often host specific, i.e. Sudden Oak Death in Oaks. Fungal cankers are often the result of a fungal spore entering a wound or crack in the bark and reproducing.

Cankers can appear as areas of cracked or missing bark, discolored bark, sunken bark or calloused bark. Cankers can sometimes exude fluids, have strong odors or host obvious fungal growths. Cankers can girdle branches and/or the trunk, cause structural weaknesses and cause death of the plant.

**Trees with Cankers can be treated with: PHOSPHO-jet or Arbor-OTC®.**

### CANKERWORM



Spring and Fall Cankerworm are distinct but very similar species belonging to the Lepidoptera order of insects. The Fall Cankerworm caterpillar is green or green/brown, with a dark stripe along the back and white stripes along its sides. The Spring Cankerworm is the same size but is darker green or reddish green with a yellowish stripe down each side. It attacks many tree hosts but prefers elm, hackberry and locust.

Cankerworm feeding is first indicated by small holes in the leaves. As the larvae mature they will consume all but the largest ribs of the leaf. The best evidence of Cankerworm infestation is the presence of the Cankerworm itself.

**Trees with Cankerworm can be treated with: ACE-jet or AzaSol™.**

## CATERPILLARS



Caterpillars are the larvae of moths and butterflies which belong to the large order of insects, Lepidoptera. There are 180,000 known species. Lepidoptera larvae eat foliage, buds, cambium, fruit and roots. Some species, such as Gypsy Moth, are highly destructive and can completely defoliate a tree. Successive years of defoliation from caterpillars will weaken a tree and often lead to its death.

Feeding damage from caterpillars is most often represented by chewed and/or consumed leaves. Often the best indicator of caterpillar infestation is the presence of the caterpillar itself.

**Trees with Caterpillar can be treated with: TREE-äge®, TREE-äge® G4, (Caterpillars on TREE-äge label: Bagworm, Fall Webworm, Gypsy Moth, Mimosa Webworm, Oak Worm, Tussock Moth, Leaf Miners, Sawfly, Tent Caterpillars, Western Spruce Budworm, and Winter Moth), ACE-jet, or AzaSol™.**

## CHLOROSIS



Chlorosis describes a condition in which a tree's foliage loses its healthy green color and fades to a pale green or yellow hue. Chlorosis is often caused by deficiencies of the micro-elements iron, manganese or zinc and is common to oak and maple.

Leaves turn progressively paler green to yellow, with only main veins of the leaf remaining green. Growth is slowed or stunted. As Chlorosis continues, the leaf veins turn yellow, the leaf dies and falls off. Whole limbs may die back and eventually the death of the tree could occur.

**Trees with Chlorosis can be treated with: Mn-jet Fe.**

**Palm trees with Chlorosis can be treated with: PALM-jet.**



## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

CLEARWING BORER



Clearwing borers are moths which resemble wasps or hornets. Their name comes from their see through wings. The larvae, which do all the damage, are unseen, living and feeding on the vascular tissue under the bark.

The feeding and tunneling activity of the larvae interrupts the flow of water and nutrients within the tree, causing wilting and dieback in the limbs and crown. Their tunneling also structurally weakens limbs, making them susceptible to breakage. Signs of infestation will be exit holes in the trunk and “frass” (excrement) and/or sawdust outside the hole. Another visible sign could be the presence of the brown pupal case protruding from the hole.

**Trees with Clearwing Borers can be treated with: TREE-äge®, TREE-äge® G4, ACE-jet or AzaSol™.**

DUTCH ELM DISEASE



Dutch Elm Disease is a vascular wilt disease caused by the fungus *Ophiostoma ulmi*. The disease affects many species of elm, the American Elm being the species most susceptible to death from this disease. It is spread by two species of elm beetle as well as through root grafts.

The fungus spreads through the vascular system, rapidly diminishing the ability of the tree to transport water and nutrients. Common first signs will be “flagging,” which is the wilting or yellowing leaves in the small branches in the crown of the tree. When the fungus is introduced by the native elm bark beetle, whole branches and limbs may begin to wilt and turn yellow. If left untreated, death will occur.

**Trees with Dutch Elm Disease can be treated with: Propizol® Fungicide.**

EMERALD ASH BORER

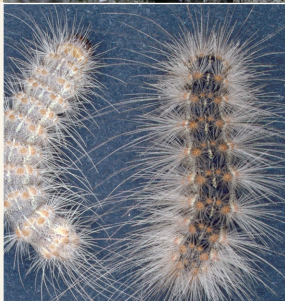


The Emerald Ash Borer (EAB) is an invasive wood-boring beetle introduced from Asia that attacks ash trees. This metallic green beetle was first found in Michigan and Ontario in 2002, and has since been spreading across the country.

Damage is caused by the larvae feeding internally on the vascular tissue of the tree, interrupting the tree's ability to transport water and nutrients. Early symptoms will be gradual thinning of the canopy and dieback of limbs. As the infestation progresses, the canopy continues to thin and die back. In later stages of infestation, epicormic, or shrub-like growth at the base of the tree occurs, along with visible "D" shaped exit holes and sloughing off of bark. Left untreated, death will occur.

**Trees with Emerald Ash Borer can be treated with: TREE-äge®, TREE-äge® G4, IMA-jet or ACE-jet.** (*TREE-äge provides up to two years of control with one application.*)

FALL WEBWORM



Fall Webworm is a defoliating caterpillar found in eastern and central US, from Canada to the Gulf of Mexico. The caterpillar can have either a darkish body with a light stripe down the back or yellow green with a dark stripe down the middle of the back, about 1 inch long and with long, whitish hairs. It commonly attacks birch, cherry, mulberry, alder, willow, cottonwood, and crabapple.

The caterpillars live and feed on the foliage inside the tents they make at the branch tips. As they grow, they expand their webs. The webs are unsightly but the actual damage to the tree is usually minimal unless infestation is severe.

**Trees with Fall Webworm can be treated with: TREE-äge, TREE-äge® G4, ACE-jet or AzaSol.™**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

FIREBLIGHT



Fireblight is a bacterial disease affecting apple, pear, crabapple, hawthorn, and quince. It is a highly contagious disease and spreads quickly between trees in close proximity.

Fireblight causes damage to virtually every part of the host tree. It can appear on the trunk, limbs or twigs as a canker. It will make leaves and twigs appear burned or scorched and will cause blossoms to turn brown and appear wet. A telltale sign is the "shepherds crook" which is created in the branch tips. Fireblight can cause the death of the tree.

**Trees with Fireblight can be treated with: PHOSPHO-jet or Arbor-OTC.™**

GALL WASP



Gall wasps are tiny wasps, as small as 1 millimeter in length, with many species across the United States. Specific species attack specific trees, i.e. the Erythrina Gall Wasp on Wili Wili trees in Hawaii. Most known gall wasps, however, attack oak trees. The wasp lays its eggs in the plant tissue which creates a "gall," or abnormal growth, where the eggs were deposited. The larvae live and feed inside the gall.

Generally, the galls are more of an eyesore than a threat to the tree. Galls can form on leaves, stems, twigs, buds and roots. One of the more common is the Oak Gall Wasp which forms spherical galls on the leaves.

**Trees with Gall wasps can be treated with: IMA-jet, TREE-äge® or TREE-äge®G4.**

GYPSY MOTH



Gypsy Moth is a highly destructive caterpillar which was accidentally introduced to the US in the northeast but which has spread to the central US and Mid-Atlantic states and continues to spread further each year. The caterpillar is distinctive for its rows of blue and red/orange spots. It will feed on many species of trees with a preference for oak and aspen.

Its feeding damage is typical of caterpillars where the leaf is chewed, with early stage caterpillars chewing holes in the leaf and later stage caterpillars consuming the entire leaf, leaving the tree defoliated or very thin. The best evidence of Gypsy Moth infestation is the presence of the caterpillar itself.

**Trees with Gypsy Moth can be treated with: TREE-äge®, TREE-äge® G4, ACE-jet or AzaSol.™**

INVASIVE SHOT HOLE BORER



The adult beetles are very small, ranging from 0.05 to 0.1 inches in length. They come in a range of shades between black (females) and brown (males) coloring. While this beetle attacks a large number of plant species, the majority of which are hardwoods, it can only reproduce in 31 species including maples, sycamore, oaks, willows, alders, and avocado.

The characteristics of PSHB attack and fungus infection differ among tree species. The beetle commonly attacks the main stem and larger branches of trees and shrubs, but injury can be found on twigs as small as 1 inch in diameter. The beetle produces a very precise, perfectly round, tiny (< 0.1 inches in diameter) entry hole in most trees. Wet staining and discoloration on the bark of the main stem and branches are early symptoms of beetle attack.

**Trees with ISHB can be treated with: TREE-age, TREE-age G4, Propizol two-step program**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

### JAPANESE BEETLE



Japanese Beetle is an invasive insect introduced to the United States in 1916. It is found primarily east of the Mississippi River and isolated pockets in more western states. The adult is 8-10 millimeters long, with a shiny green metallic thorax and copper/bronze colored wings. It will feed on a variety of trees, including maple, linden, apple, crabapple, pin oak, birch, plum and cherry among others.

The adult beetle “skeletonizes” the leaf, consuming the tender leaf tissue and leaving the veins behind, causing the leaf to have a lace-like appearance. The best evidence for Japanese Beetle infestation is the presence of the beetle itself.

**Trees with Japanese Beetle can be treated with: IMA-jet, ACE-jet, or AzaSol.**

### LEAF MINERS



“Leaf Miners” is a general term for tiny insects which feed and develop between the epidermal layers of leaves. Leaf Miners can be flies, wasps, moths or beetles. A common Leaf Miner is the Birch Leaf Miner which attacks birch trees, but there are species which attack apple, oak, beech, elm, cherry, locust, and hawthorn.

The damage is characterized by brownish, semi-translucent blotches on the leaves, representing the “mines” inside of which the immature larvae are feeding. To differentiate Leaf Miner damage from similar looking leaf spot diseases, look closely at the affected area of the leaf for the presence of the larva or its droppings inside the mined area.

**Trees with Leaf Miner can be treated with: TREE-äge®, TREE-äge® G4, IMA-jet or AzaSol.™**

## LINDEN BORER

(ROUNDHEADED BORER)



Linden Borer is a boring beetle that attacks linden and poplar trees. It is commonly found in the northeastern quadrant of the US. The adult beetle is olive in color with long antennae. The larvae of the beetle feed under the bark, usually near ground level, on vascular tissue, structural wood and surface roots.

Indicators of a Linden Borer infestation will be decline in vigor, with limbs lowest to the ground declining and dying and holes in the trunk near the ground.

**Trees with Linden Borer can be treated with: TREE-äge®, TREE-äge® G4 or IMA-jet.**

## MITES



Mites are similar to insects but belong to the spider family. There are thousands of species, but perhaps most common in the landscape would be Spider Mites and Gall Mites. Spider Mites are common pests of hemlocks and other landscape conifers. Mites are tiny, most species being microscopic, however, Spider Mites are visible to the eye, appearing as tiny specks, frequently on the underside of the leaf and amid very fine webbing.

Evidence of Spider Mite infestation may be speckling and mottling of the leaf or needle, causing the plant to appear gray or washed out, and limited or no growth in the plant. The presence of Gall Mites will be indicated by the presence of the gall, an abnormal growth on the leave, stem or twig, inside of which the mite lives and feeds.

**Trees with Mites can be treated with: ACE-jet. Trees with Red Palm Mites can be treated with TREE-äge & TREE-äge G4. Small plants with mites can be treated with Eco-1.™**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

### OAK WILT



Oak Wilt is fungal disease which affects the vascular tissues of oak trees. It is mostly found in eastern and central states and some areas of Texas.

The fungus damages the tree by causing the vascular system to become plugged, limiting or eliminating the tree's ability to move water and nutrients. Initial signs of oak wilt infection are leaves which turn brown from the outward edges in. This symptom spreads quickly throughout the tree causing defoliation and ultimately death.

**Trees with Oak Wilt can be treated with: Propizol® Fungicide.**

### PINE BARK BEETLES



There are numerous species of bark beetles which attack trees throughout the United States. They are typically small, 3-4 millimeters long with dark cylindrical bodies. They are boring beetles which tunnel and feed under the bark within the vascular tissue of the tree.

Trees infested with bark beetles will gradually turn brown, defoliate and die. Upon inspection of the trunk, there could be exit holes and/or "pitch tubes" in the bark indicating they have either bored in or out of the bark. Their feeding interrupts the tree's ability to move water and nutrients. Several species also introduce a fungus into the tree which further inhibits the vascular system.

**Trees with Pine Bark Beetles can be treated with TREE-äge® & TREE-äge® G4** (*Bark Beetles on TREE-äge label include: Ips Engraver Beetles, Mountain Pine Beetle, Southern Pine Beetle, Spruce Beetle, Western Pine Beetle*) **or AzaSol™.**



## ROOT ROT



"Root rot" is a generic term applying to plant infection by Phytophthora. Phytophthora are fungus-like organisms which cause cankers in the bark which can destroy the vascular system and which cause roots to rot and cease to function. There are many species of phytophthora affecting many types of plants and trees, including but not limited to dogwood, maple, hemlock, fir, cedar, and white pine. One species, *Phytophthora Ramorum* is the pathogen causing Sudden Oak Death in Oaks.

One visible sign of phytophthora, or root rot, is the formation of cankers in the bark of the trunk. The bark around a canker will crack and/or appear water-soaked and may or may not be oozing and emitting an odor. Leaves could appear drought stressed, wilted or stunted.

**Trees with Root Rot can be treated with: PHOSPHO-jet.**

## RUGOSE SPIRALING



In 2009, a new species of nuisance whitefly was discovered in Miami-Dade County in Florida on a Gumbo Limbo tree. Rugose Spiraling Whitefly has a wide host range including Gumbo Limbo, palms, mangos, avocados, etc.

An infestation of Rugose Spiraling Whitefly is generally easy to spot due to the sticky "honeydew" the insect produces. Black sooty mold may also grow on the honeydew. You may also see the flies themselves and the white spiraling patterns they make on the bottoms of leaves, which may look like dust. Leaf drop may occur in some species of trees and palms.

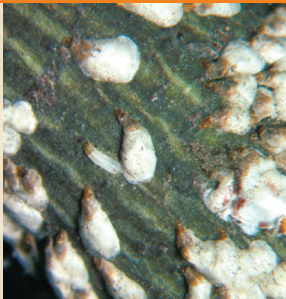
**Trees and Palms with Rugose Spiraling Whitefly (RSW) can be treated with: IMA-jet, AzaSol™**



## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

SCALES (HARD)

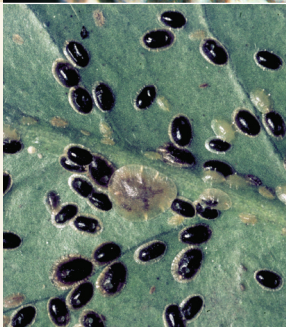


Hard scales are stationary, sucking insects that secrete a waxy covering over their bodies, which looks like a plate of "armor." They can be round or oval in shape and can be flat or domed. There are numerous species of hard scales affecting many kinds of trees.

Scales pierce the plant and suck out the vital nutrients, causing the plant to gradually decline in health and appearance. Look for the presence of scale on the twig, stem or leaf. Another common indicator of scale is a sticky secretion that will be on objects beneath the tree.

**Trees with Hard Scales can be treated with: ACE-jet or AzaSol™**

SCALES (SOFT)



"Soft" scales are similar to hard scales in that they also cover their bodies with a coating, however, the coating on a "soft" scale is an actual part of their body and not just a covering. Soft scales come in a variety of shapes and sizes (Cottony Maple Scale pictured) and can be small (2-3 millimeters) to large (14 millimeters).

Like hard scales, soft scales penetrate the plant tissues and suck out the vital nutrients, causing the plant health to decline and growth to slow or stop. Look for the presence of the scale on the twig, stem or leaf.

**Trees with Soft Scales can be treated with: IMA-jet, AzaSol™ or ACE-jet.**

Photo: United States National Collection of Scale Insects Photographs Archive, USDA Agricultural Research Service, Bugwood.org - See more at: <http://www.forestryimages.org/browse/detail.cfm?imgnum=5110096#sthash.brouqNVi.dpuf>



Texas Phoenix Palm Decline (TPPD), recently introduced to Florida is a disease lethal to a number of palms including Phoenix species. The causal agent, a phytoplasma, is spread by an as yet unknown vector. TPPD can kill mature, susceptible palms in as little as 4 months. TPPD is most likely vectored by piercing-sucking insects (Order Hemiptera) that are known to spread phytoplasmas to plants.

Symptoms include fruit drop, necrosis of inflorescence, bronzing of lower foliage which progresses upward, subsequent spear leaf collapse and TPPD Systemic Injection death.

We recommend a two-part treatment using either AzaSol or IMA-Jet in addition to Arbor OTC every 120 days.

**Trees with TPPD can be treated with Arbor OTC and IMA-Jet two-step program**



Thrips are tiny, thin insects, about 1mm in length, which are of the "piercing-sucking" variety, meaning they pierce the plant tissue with their mouth parts and suck out the nutrients. There are hundreds of species of thrips which feed on many species of plants, including but not limited to, dogwood, magnolia, maple, and palm. Generally, they are about 1mm in length.

Feeding damage from thrips can appear as discolored or deformed leaves and stunted growth. Certain species of thrips are also known to carry and spread plant pathogens which can also do damage to the host tree.

**Trees with Thrips can be treated with: IMA-jet, ACE-jet or AzaSol™**

## INSECT AND DISEASE

## DESCRIPTION AND TREATMENT

TWO LINED CHESTNUT BORER

(FLATHEADED BORER)



The Two Lined Chestnut Borer is found primarily in the eastern half of the US and is a pest of oak trees. The insect was named for its preferred host tree, the American Chestnut, which has become rare as a result of Chestnut Blight. The adult is dark and slim-bodied, about 10-13 mm in length, with two bronze stripes down the back.

The larvae of the Two Lined Chestnut Borer, which do the actual damage to the tree, are unseen, feeding and developing under the bark within the vascular tissue of the tree, interrupting the flow of water and nutrients. Initial signs of infestation will be scattered areas of foliage which wilts and browns but does not fall off, leading to branch dieback the following year. Later in the infestation stage, D-shaped exit holes can be found in the trunk.

**Trees with Two Lined Chestnut Borer can be treated with:**

**TREE-äge®, TREE-äge® G4, IMA-jet or ACE-jet.**

WINTER MOTH



Winter Moth is a non-native, invasive insect which has been found in Washington, Oregon and Massachusetts. The Winter Moth caterpillar is bright green, about 15mm in length and resembles an inchworm. It feeds on many different tree species, including but not limited to maple, oak, linden, ash, crabapple, apple, cherry, and spruce.

The early stage caterpillar will bore into the foliar buds of the host tree prior to the tree leafing out, consuming the young leaves or leaving them heavily damaged before they unfold. Leaves will have holes or be virtually consumed. The most conspicuous evidence of Winter Moth infestation will be the caterpillar itself.

**Trees with Winter Moth can be treated with: TREE-äge, TREE-äge G4 ACE-jet or AzaSol™.**

We welcome your questions and comments.  
Contact us at 781.935.9070.

For ordering information, call or visit us at [www.arborjet.com](http://www.arborjet.com).

©2015 Arborjet, Inc. **Important: Always read and follow label instructions. Some crop protection products may not be registered for sale or use in all states or counties. Please check with your state or local extension service to ensure registration status.** TREE-äge® Insecticide is a Restricted Use Pesticide and must only be sold to and used by a state certified applicator or by persons under their direct supervision. TREE-äge® is a registered trademark of Arborjet, Inc.

View all photo credits online at [www.arborjet.com/docs/pocket-guide-cite.pdf](http://www.arborjet.com/docs/pocket-guide-cite.pdf)



99 Blueberry Hill Road • Woburn, MA 01801

**Contact us at 781.935.9070 and visit us on the web at [www.arborjet.com](http://www.arborjet.com)**

TREE-äge® is a Restricted Use Pesticide and may only be sold to and used by a state certified applicator or by persons under their direct supervision.

TREE-äge® is a registered trademark of Arborjet, Inc.