



RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY



2025 Ornamental IPM Program Webinar

Contemporary IPM Topics and Management

May 13, 2025

Bill Errickson & Steve Rettke (Monmouth)

Tim Waller (Cumberland)

Support: Erin Quinn

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and Boards of County Commissioners, Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

TODAYS SPEAKERS

Bill Errickson (Ag. Agent - Monmouth County RCE)

Steve Rettke (IPM Program Associate – Monmouth County RCE)

Tim Waller (Ag. Agent – Cumberland County RCE)

Erin Quinn (IPM Program Support)

Disclaimer - Materials do not cover all possible control scenarios and are intended for licensed professionals. Tradenames do not imply endorsement and are used as examples. You must strictly follow the label for each compound prior to use. Rutgers is not responsible for misused materials or damages thereof. The label is the law. Labels will provide detailed information on use and restrictions. Additionally, application intervals, compatibility, surfactant use, PHI, PPE, important and other key information is described in detail. Always discuss treatments with your local agents. **Note: Neonicotinoids can only be legally applied in commercial agriculture settings by licensed applicators.**

Boxwood Blight Alert



Boxwood Blight Predictions as of 5/12/25

https://uspest.org/risk/boxwood_app

SOUTH NJ (NJ50)			CENTRAL NJ (NJ10)			NORTH NJ (NJ59)		
Date	Risk index	Risk class	Date	Risk index	Risk class	Date	Risk index	Risk class
10-May	0	Very Low Risk	10-May	0	Very Low Risk	10-May	14	Very Low Risk
11-May	64	Low Risk	11-May	66	Low Risk	11-May	0	Very Low Risk
12-May	0	Very Low Risk	12-May	0	Very Low Risk	12-May	0	Very Low Risk
13-May	205	1st Infec. Susc. Vars.	13-May	186	Low Risk	13-May	86	Low Risk
14-May	313	Up to 5-18 Lesions	14-May	282	Up to 5-18 Lesions	14-May	166	1st Infec. Susc. Vars.
15-May	750	Up to 5-18 Lesions	15-May	719	Up to 5-18 Lesions	15-May	538	Up to 3-13 Lesions
16-May	290	Up to 1-6 Lesions	16-May	266	Up to 1-6 Lesions	16-May	247	1st Infec. Susc. Vars.
17-May	291	1st Infec. Susc. Vars.	17-May	267	1st Infec. Susc. Vars.	17-May	248	1st Infec. Susc. Vars.

- **Removed diseased** leaves, stems, plants, soil when **DRY**
- (Pathogen persistent for LONG periods)
- **Protective fungicides:** chlorothalonil [M5], Trifloxystrobin [11] + Fluopyram [7], Mancozeb [M3], Tebuconazole [3]

Bronze Birch Borer Update

Bronze Birch Borer Predictions as of 5/12/25

https://uspest.org/dd/model_app?sta=NJ50&spp=bbb&tab=table

SOUTH NJ (NJ50)			CENTRAL NJ (NJ10)			NORTH NJ (NJ59)		
Date	DDs cumu	Events	Date	DDs cumu	Events	Date	DDs cumu	Events
1-Jan	2	* START *	1-Jan	3	* START *	1-Jan	0	* START *
30-Mar	256	Prepupal larvae in OW cells under bark	3-Apr	267	Prepupal larvae in OW cells under bark	22-Apr	266	Prepupal larvae in OW cells under bark
16-Apr	404	Beginning of pupation	20-Apr	413	Beginning of pupation	1-May	415	Beginning of pupation
4-May	758	First adults exit trees	8-May	753	First adults exit trees	11-May	578	* NOW *
11-May	905	* NOW *	11-May	804	* NOW *	20-May	752	First adults exit trees
14-May	975	10% adult emergence	18-May	957	10% adult emergence	31-May	967	10% adult emergence
20-May	1120	50% adult emergence	26-May	1120	50% adult emergence	7-Jun	1122	50% adult emergence

Relieve stress as much as possible

DON'T prune dead wood just before BBB adult emergence (*egg laying in wounds*)

Preventative bark sprays: Pyrethroids (targeting newly hatched / chewing larvae) **Systemic insecticides: (eg. Neonicotinoids)** offer excellent



Clearwing Borer Update

CLEARWING BORER Predictions as of 5/12/25

https://uspest.org/dd/model_app

SOUTH NJ (NJ50)			CENTRAL NJ (NJ10)			NORTH NJ (NJ59)		
Date	DDs cumu	Events	Date	DDs cumu	Events	Date	DDs cumu	Events
1-Jan	0	* START *	1-Jan	0	* START *	1-Jan	0	* START *
22-Apr	165	Lilac / Ash Borer (<i>Podotesia syringae</i>) - Adult FLIGHT	25-Apr	152	Lilac / Ash Borer (<i>Podotesia syringae</i>) - Adult FLIGHT	29-Apr	153	Lilac / Ash Borer (<i>Podotesia syringae</i>) - Adult FLIGHT
23-Apr	176	Dogwood Borer (<i>Synanthedon scitula</i>) - Adult FLIGHT	26-Apr	168	Dogwood Borer (<i>Synanthedon scitula</i>) - Adult FLIGHT	30-Apr	160	Dogwood Borer (<i>Synanthedon scitula</i>) - Adult FLIGHT
5-May	351	Lesser peach tree borer (<i>Synanthedon pictipes</i>) - Adult FLIGHT	11-May	348	* NOW *	11-May	263	* NOW *
11-May	431	* NOW *	12-May	360	Lesser peach tree borer (<i>Synanthedon pictipes</i>) - Adult FLIGHT	18-May	354	Lesser peach tree borer (<i>Synanthedon pictipes</i>) - Adult FLIGHT
16-May	524	Rhododendron borer (<i>Synanthedon rhododendri</i>) - Adult FLIGHT	23-May	515	Rhododendron borer (<i>Synanthedon rhododendri</i>) - Adult FLIGHT	31-May	513	Rhododendron borer (<i>Synanthedon rhododendri</i>) - Adult FLIGHT
20-May	582	Greater peach tree borer (<i>Synanthedon exitiosa</i>) - Adult FLIGHT	28-May	589	Greater peach tree borer (<i>Synanthedon exitiosa</i>) - Adult FLIGHT	5-Jun	587	Greater peach tree borer (<i>Synanthedon exitiosa</i>) - Adult FLIGHT

Please let us know if you would like wing and delta traps with pheromones

Lilac / Ash Borer



Whitney Cranshaw -CO State

Dogwood Borer



David Laughlin

Rhododendron Borer



John Neal USDA-ARS

Other Updates



RED-HEADED FLEA BEETLE Predictions as of 5/12/25

https://uspest.org/dd/model_app

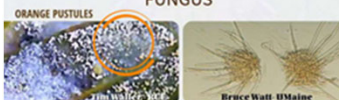
	SOUTH NJ (NJ50)		
	Date	DDs cumu	Events
SOUTH NJ (NJ50)	30-Apr	257	Start Egg hatch and larvae gen one
	11-May	431	* NOW *
	16-May	524	Start Adult feeding gen one
CENTRAL NJ (NJ10)	12-Jun	1031	END Adult feeding gen one
	3-May	252	Start Egg hatch and larvae gen one
	11-May	348	* NOW *
NORTH NJ (NJ59)	24-May	529	Start Adult feeding gen one
	20-Jun	1035	END Adult feeding gen one
	8-May	251	Start Egg hatch and larvae gen one
	11-May	263	* NOW *
	1-Jun	527	Start Adult feeding gen one
	29-Jun	1032	END Adult feeding gen one

Free Printable resource



VOLUTELLA BLIGHT

(Pseudonecrotia buxi)
FUNGUS



Symptoms: Straw color leaves - attached, orange sporodochia after prolonged warm/damp periods.
Active period: Spring through fall. High humidity.
Management: Remove leaf litter, trim diseased branches below infected transition zone (canker). Promote airflow. Regular protective fungicides.



WE R HERE WHEN YOU NEED US

REFERENCE GUIDE TO COMMON

BOXWOOD

Pests and Diseases



RUTGERS UNIVERSITY
Agriculture and Natural Resources
New Jersey Agricultural Experiment Station
IN COOPERATION WITH
NEW JERSEY DEPARTMENT OF AGRICULTURE
PLANT INDUSTRY DIVISION

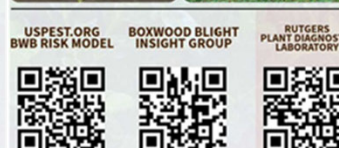
Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and Boards of County Commissioners, Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station. In an equal opportunity/affirmative action institution.

BOXWOOD BLIGHT

(Calonecrotia spp.)
FUNGUS



Symptoms: Leaf drop, necrotic lesions on leaves, dark cankers on stems. White fluffy mycelium.
Active period: Cool, damp periods in spring and late summer. Sticky spores are very easily spread.
Management: Remove diseased plants and soil (persistent sclerotia in soil). Protective fungicides.



USPEST.ORG BWB RISK MODEL BOXWOOD BLIGHT INSIGHT GROUP RUTGERS PLANT DIAGNOSTIC LABORATORY

Agenda



1. Lady bird beetle
2. Red headed pine sawfly
3. Hemlock woolly adelgid
4. Boxwood mites
5. Boxwood psyllid
6. Armored scales
 - Pine needle scale
 - Elongate hemlock scale
 - Oystershell scale
7. Four-lined plant bug
8. Needle cast diseases
9. BMPS Oomycetes
 - Phytophthora
 - Pythium

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Beneficial Insect: Lady Bird Beetle

GDD Window (base 50): 83-621

- Lady bird beetles (*Coccinellidae*), also known as ladybugs
- Often considered the first line of defense against many soft bodied pest insects
- Larvae and adults feed on insects, while adults also feed on nectar, pollen, and honeydew - one beetle can eat over 5000 aphids in its lifetime!
- Eggs are tiny, bright yellow-orange, and spindle shaped
- Larvae look different from adults, and are flattened and tapered, up to ¼" long, and dark colored with orange or yellow markings, often with short bristles along the body and three pairs of legs. Larvae move quickly.
- Adults are from ¼-3/8" long, and round or oval, coming in bright colors ranging from black to pink, yellow, or red, and may or may not have spots on the wings
- Reside on leaf undersides
- **Prey pests:** aphids, spider mites, scales, whiteflies, leaf beetle larvae, insect eggs, and small caterpillars



Photo via Mary C. Legg, Bugwood.org

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Beneficial Insect: Lady Bird Beetle

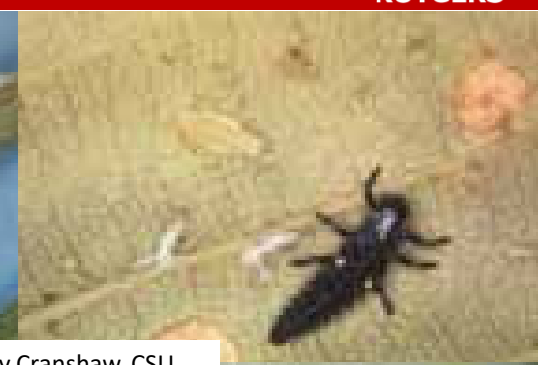
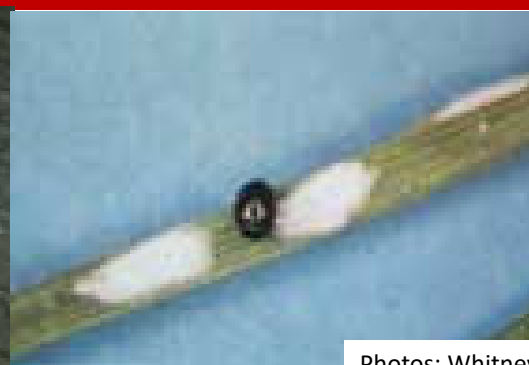


Photo: © entomart

Current GDD: 5/13/25
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Beneficial Insect: Lady Bird Beetle

Photo: Joseph Berger



Photos: Whitney Cranshaw, CSU

Life cycle of the convergent lady beetle, *Hippodamia convergens*

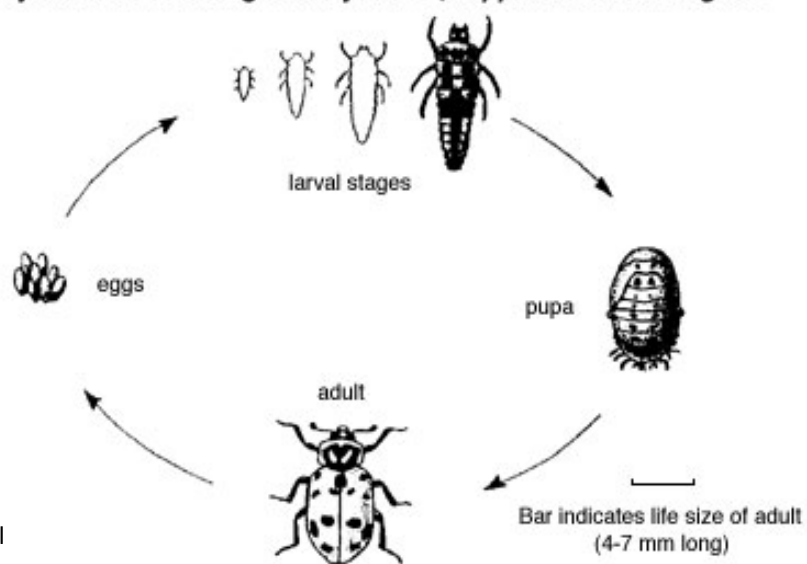


Photo: Cornell Entomology



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Beneficial Insect: Lady Bird Beetle



Photos: Lauren Errickson

Current GDD: 5/13/25
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Beneficial Insect: Lady Bird Beetle

GDD Window (base 50): 83-621

Fostering beneficial insect populations

- Allow minor populations of soft body pest populations, especially in plants not sold that year
- Avoid broad spectrums wherever possible
- Monitor shaded regions for beneficial predators

Beneficial predator food!



Pesticide Impacts / Considerations

- Insecticides negatively impact ladybird beetles through direct contact and also when they eat prey that has been treated with insecticides
- Some insecticides can have less of an impact on ladybirds
 - Emamectin benzoate
- Larvae are more susceptible than adults
- If absolutely necessary, apply insecticides in the late evening or at night to minimize its impact on lady beetles

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Redheaded pinesawfly (*Neodiprion lecontei*)



GDD Window (base 50): 246-1388 (1st generation)

- Overwinter as prepupae in small ($\frac{1}{2}$ inch), brown cocoons in the soil
- Adults resemble flies or bees, $\frac{1}{2}$ " long, brown, with stout bodies
- Females lay their eggs in slits they cut into needles and leaves
- **Larvae are immature wasps** that resemble tiny caterpillars; they reach 1-inch-long worm-like insects having reddish heads, yellowish-white bodies, and black spots
- Larvae feed in groups of a couple dozen or more & defoliate terminal branches; 2 generations per year
- Some prepupae develop the following year, some take 2 or more years
- Cause defoliation or plant death, needle discoloration, and straw-like needle remains with frass being found beneath the trees
- **Host plants:** Conifers (spruces, cedars, larches)
 - o Shortleaf, loblolly, slash, jack, red, longleaf, pitch, Swiss, mountain, white, and mugo pines



Photo via Steve Rettke, Rutgers RCE

Current GDD: 5/13/25
North NJ: 280 GDDs
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Southern NJ: 460 GDDs

Redheaded pinesawfly (*Neodiprion lecontei*)

Photo credits Steve Rettke, Rutgers RCE unless otherwise noted



Redheaded Pine Sawfly Damage



Joe Boggs, OSU Extension©



First Instar
European Pine Sawfly
Damage

Joe Boggs, OSU Extension©



Joe Boggs, OSU Extension©



Photo: James
McGraw, NCSU

Current GDD: 5/13/25
North NJ: 280 GDDs
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Southern NJ: 460 GDDs

Redheaded pinesawfly (*Neodiprion lecontei*)



GDD Window (base 50): 290+ (adult emergence), 448-700 (larvae emergence)

Management

- Cultural Practices:

- **Natural predators:** birds, rodents, predatory beetles, parasitic wasps
- Reduce plant stress
- Hand pick and destroy isolated infestations
- Strike branches to cause larvae to fall, and collect them in a bucket of soapy water

Materials

○ Contact insecticides:

- Pyrethroids [3]: -thrins
- Carbamates [1A]: carbaryl

○ Considerations:

- Will impact non-target species. Be mindful of overapplying and timing of sprays.

- Biorationals:

- Spinosyns [5]; Spinosad
- Horticultural soaps and oils
 - Effective on young larvae, but less so for larger larvae
- Bt is not effective

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Hemlock woolly adelgid (*Adelges tsugae*)

GDD Window (base 50): 10% of eggs – 150, 50% - 350, 100% - 1000; 1001-2200 (nymphs)

- Overwinter as wingless adults
- Lay brownish orange eggs in early spring under the body of the female covered in woolly white wax
- Reddish brown crawlers hatch in late spring and remain present throughout the summer on branch terminals at the base of needles
- Crawlers are spread by wind, birds, animals, and humans
- Settled crawlers are black with a white fringe around their bodies
- Growing adelgids cover themselves in a woolly white wax
- Two generations per year
- Cause needles to turn grayish-green or yellow, and drop early, branch dieback, thinning crown, bud and shoot dieback, dieback of major limbs from the base of the trunk upwards
- **Host plants:** hemlock (Eastern and Carolina), spruce trees



Photo via UMaine Extension

Current GDD: 5/13/25
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Hemlock woolly adelgid (*Adelges tsugae*)



Photo: John Ghent



© C D Armstrong



© C D Armstrong



© C D Armstrong

Photos: UMaine Extension



Photos :MSU



Current GDD: 5/13/25
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Hemlock woolly adelgid (*Adelges tsugae*)

GDD Egg Hatch Percentages: (10% hatch = 150 GDD); (50% egg hatch = 350 GDD); (100% hatch ~ 1000 GDD)

Management

- Cultural Practices:

- **Natural predators:** *Laricobius nigrinus* beetle
- Avoid using nitrogen fertilizers
- Remove nearby birdfeeders, birds spread HWA
- Avoid pruning when eggs and crawlers are present
- Reduce plant stress

Materials

○ Contact insecticides:

- Pyrethroids [3]
- Carbamate [1A]: carbaryl
- Glycosides [6]: abamectin

○ Systemic insecticides:

- Neonicotinoids [4A]: imidacloprid, dinotefuran, acetamiprid
- Glycosides [6]: abamectin

○ Considerations:

- Will harm non-target species

- Biorationals:

- Horticultural oil
- Insecticidal soap
 - Spray once before egg laying begins
 - Another spray during summer after eggs hatch

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Boxwood mites (*Eurytetranychus buxi*)

GDD Window (base 50): 450-700

- Overwinter as light-yellow eggs on leaves and twigs
- Neither a true cool nor warm season mite – most active during late spring and early summer (can resume activity again in late summer)
- Eggs are laid in the fall and hatch in midspring into six-legged larvae, then go through two nymph stages before emerging as adults
- Adults are yellow/tan/gray with long legs, about the size of a period
- Mating takes place immediately after adults emerge, and females begin to lay eggs within hours
- Several generations per year – life cycle is 18-21 days
- Found mostly on new growth
- Causes yellow to bronze stippling on foliage, premature defoliation
- Leaves may develop yellowish-white streaks on their upper sides
- **Host plants:** boxwoods



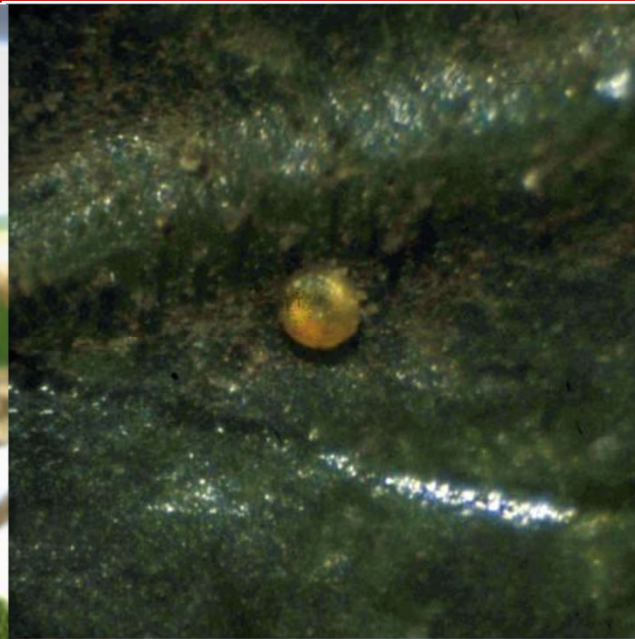
Boxwood mites feed on the upper side of the leaf.

Photo by J. R. Baker

Current GDD: 5/13/25
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Boxwood mites (*Eurytetranychus buxi*)

Photo credits Steve Rettke, Rutgers RCE



Boxwood mite egg.

Photo by J. R. Baker



Female boxwood mite. Note how the damage (arrows) occurs in lines.

Photo by J. R. Baker



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Boxwood mites (*Eurytetranychus buxi*)



GDD Window (base 50): 450-700

Management

- Cultural Practices:

- **Natural predators:** ladybird beetles, lacewings, predacious mites
- Plant resistant varieties
- Promote healthy plant growth
- Reduce plant stress
- Avoid nitrogen fertilizers
- Prune to remove severely infested leaves
- Dispose of clippings or dropped leaves, keep the surrounding area clean

Materials

○ Contact insecticides:

- Reduced risk:
 - Tetronic acids [23]: spiromesifen
 - Mitochondrial c. III electron transport inhibitors: Acequinocyl [20B], Bifenazate [20D]
- Glycosides [6]: Abamectin
- Pyrethroids [3]: Fluvalinate

○ Systemic insecticides:

- Organophosphates [1B]: Acephate

Considerations:

- Will harm non-target species

- Biorationals:

- Mite growth inhibitors [10A]: Hexythiazox
- Spinosyns [5]: spinosad
- Horticultural oils
 - Treat overwintering eggs with 2-3% dormant oils
 - Summer oils (1-2%) can control mild populations
- Insecticidal soaps

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Boxwood psyllid (*Spanioneura buxi*)



GDD Window (base 50): 290-440

- Overwinter as orange, spindle-shaped eggs
- Nymphs emerge and begin feeding as buds expand
- Nymphs feed on young foliage by piercing it while producing white, waxy strands which cover their bodies as they mature
- Adults emerge in early summer and are tiny, light green, winged, and leafhopper-like insects that cause less damage than nymphs
- Adults are referred to as "jumping plant lice"
- Leaf cups around nymphs as they feed, protecting them
- Typically minor aesthetic damage
- Edges of terminal leaves bend upwards
- Causes yellowing of leaves, and some stunted growth of terminal twigs
- **Host plants:** all boxwoods
 - o American boxwood is the most susceptible, English boxwood is less severely attacked



Photo: Robert Childs, UMass

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Boxwood psyllid (*Spanioneura buxi*)

Photo credits Steve Rettke, Rutgers RCE



Photo: John Davidson, UMD



Photo: C. Carignan, UME



Photo: Robert Childs

Current GDD: 5/13/25
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Southern NJ: 460 GDDs

Boxwood psyllid (*Spanioneura buxi*)



GDD Window (base 50): 290+ (adult emergence), 448-700 (larvae emergence)

Management

- Cultural Practices:

- **Natural predators:** lady beetles, lacewings, parasitic wasps
- Prune affected leaves during spring and destroy them
- Plant resistant varieties
- Reduce plant stress

Materials

○ Contact insecticides:

- *Not viable after leaf cupping occurs*
- Pyrethroids [3]: -thrins
- Carbamates [1A]: carbaryl

○ Systemic insecticides:

- Neonicotinoids [4A]: imidacloprid, dinotefuran, acetamiprid
- Organophosphates [1B]: Acephate (translaminar)

○ Considerations:

- Will harm non-target species

- Biorationals:

- Insecticidal soap
- Horticultural oils
- Biopesticides [UN]: azadirachtin
- Biopesticide: Fungal agents [UNF]: *Beauveria bassiana*

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Major Families of Nursery Scale Insects in NJ



- Armored Scales
- Soft Scales
- Mealybugs
- Felt Scales
- Pit Scales
- Gall-Like Oak Scales

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Common Scale Species at NJ Nurseries (examples)



Armored

- Japanese Maple
- *Euonymus*
- Pine Needle
- White *Prunicola*
- Juniper Scale

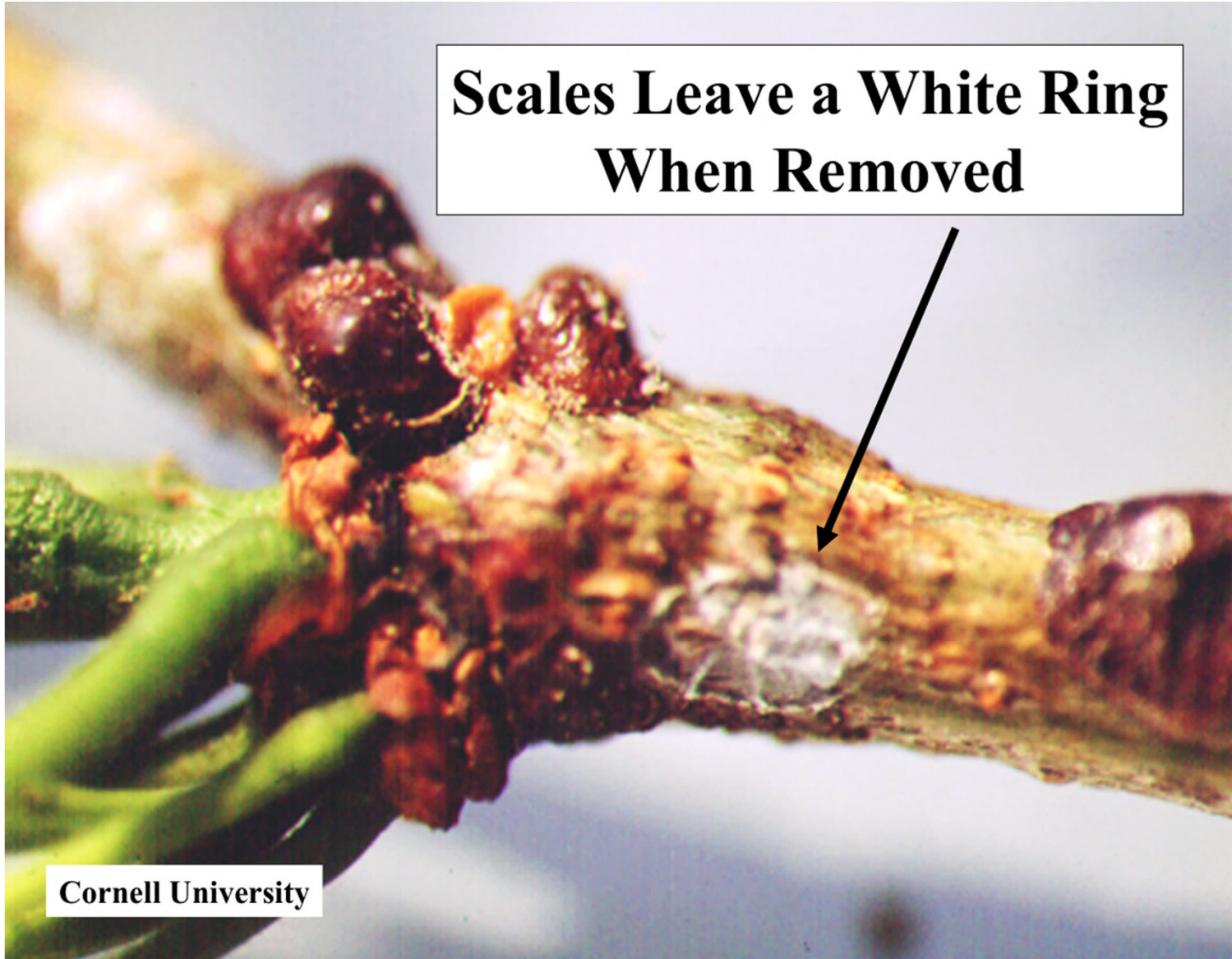
Soft

- Tuliptree
- Magnolia
- Calico
- Indian Wax
- Cottony *Taxus*

Are These Scale Insects?



**Scales Leave a White Ring
When Removed**



Cornell University

Steps in Scale Insect ID



Determine Scale Family and Species

- Scrap Thumbnail Over Suspected Scales
- Cover Characteristics
 - Color/Shape/Size/1st Instar Cast Skin Location
- Feeding Location
 - Bark/Leaves/Both
- Plant Host
 - Deciduous/Coniferous

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Armored Scales

- **No Honeydew** (feed in mesophyll cells)
- Do Not Move After Crawlers Settle
- **Leaf Stippling/Dieback Damage**
- Eggs, Nymphs, or Adults Overwinter
- 10-80 Eggs per Female
- 1, 2, or 3 Generations per Year

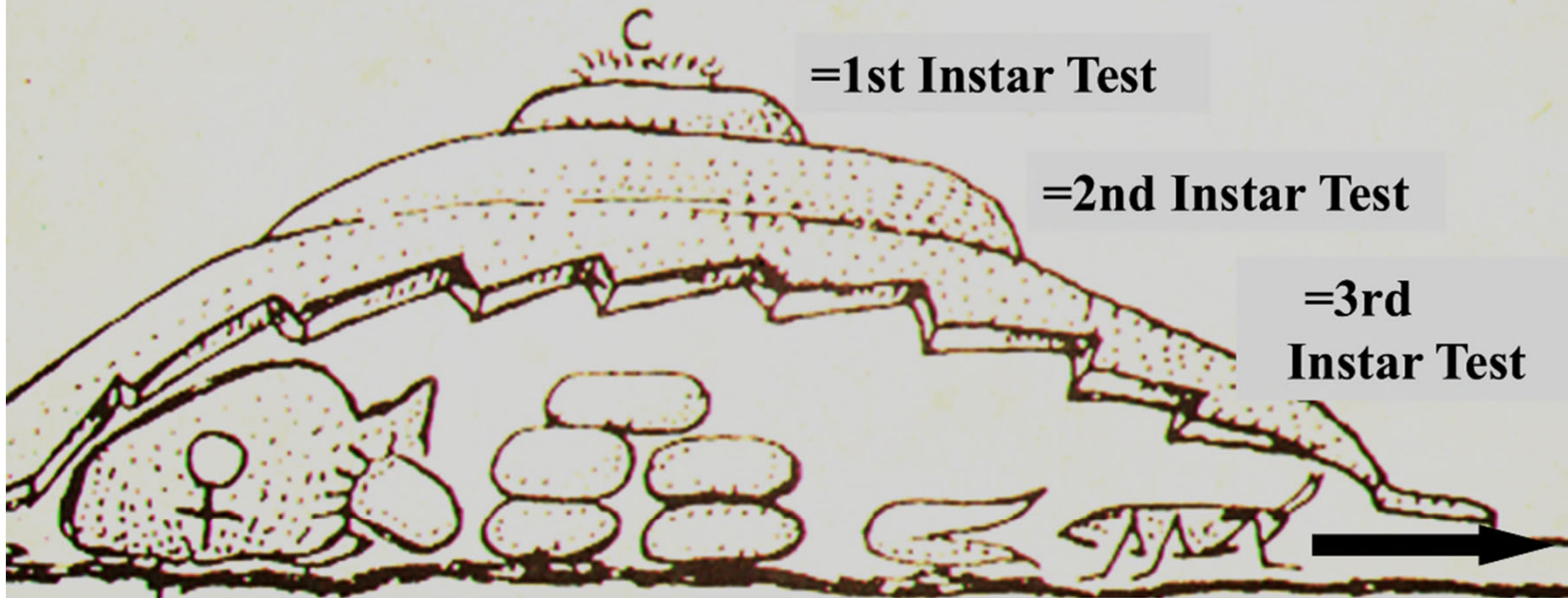
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**Uncovered
Obscure Scales**

Armored Scale

Cornell University

Armored Scale Egg Hatch = Crawlers Emerge



=1st Instar Test

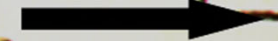
=2nd Instar Test

=3rd
Instar Test



Egg Laying
Adult Female

Emerging Crawlers



John Davidson, UMD

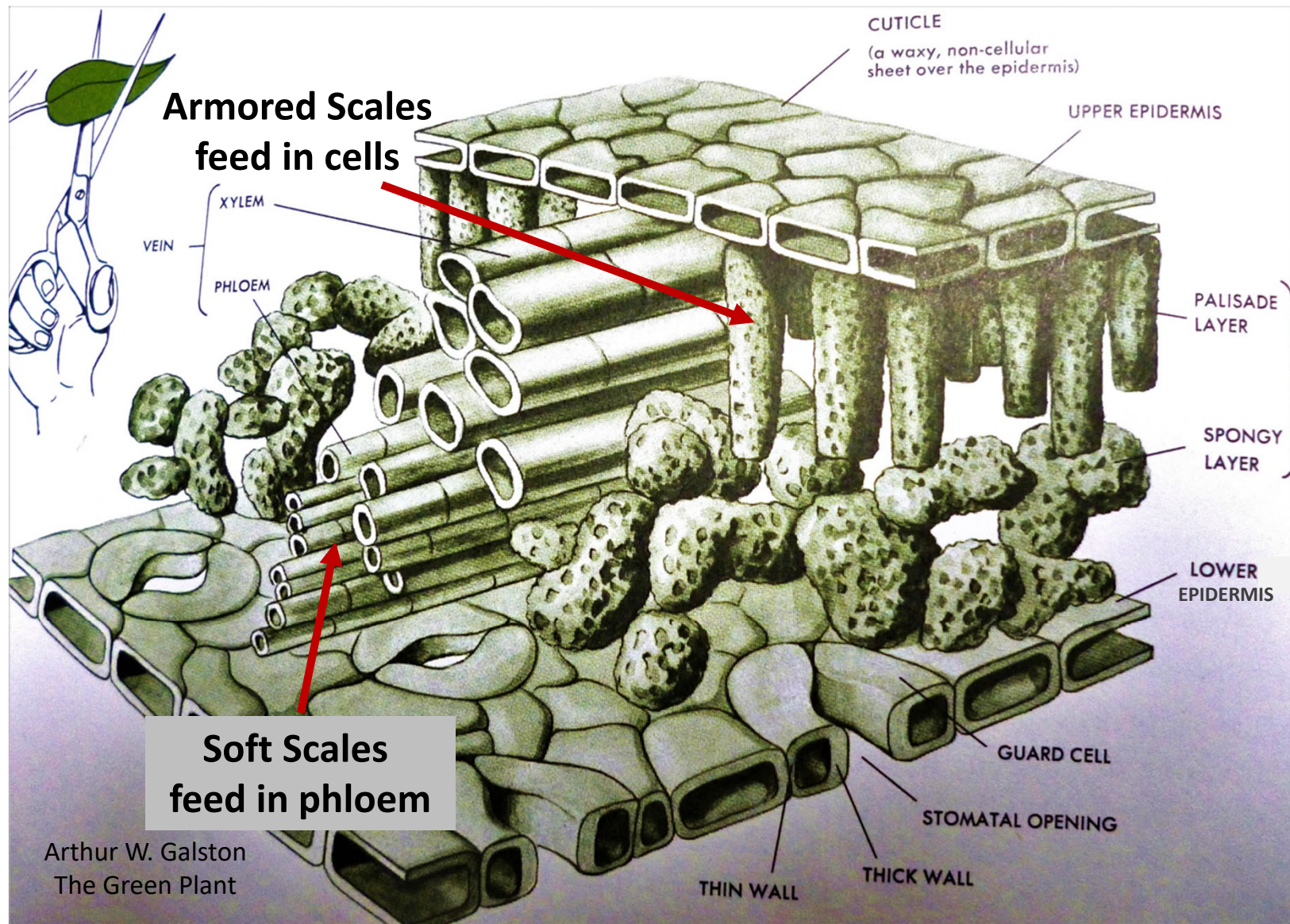


Euonymus Scale Crawlers

Armored Scale

Crawler GDD's = 533-820 & 1700+

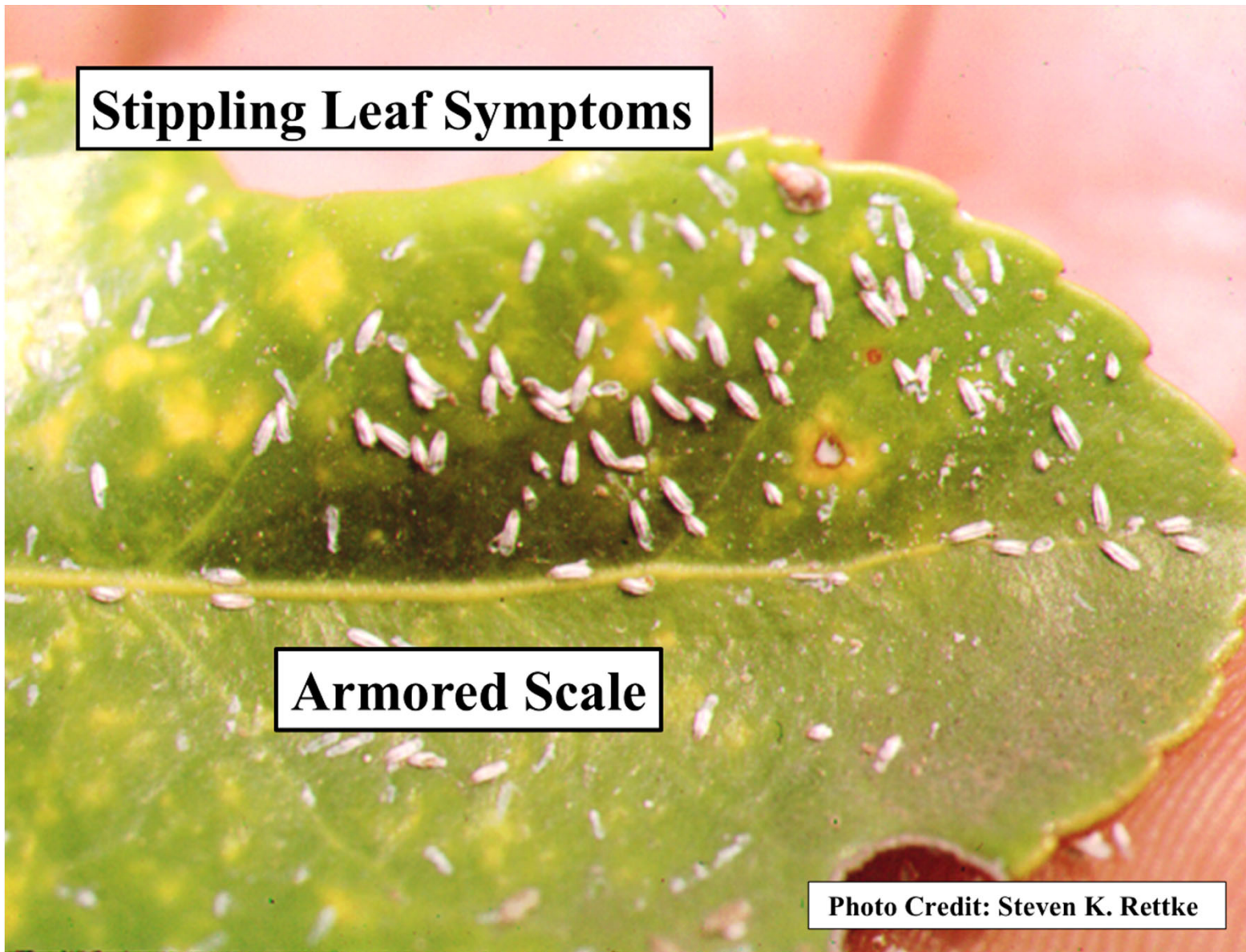
Photo Credit: Steven K. Rettke



Stippling Leaf Symptoms

Armored Scale

Photo Credit: Steven K. Rettke



Armored scales (*Diaspididae*)

GDD Control Windows: Variable depending on species / Can kill branches & trees

1. Characterized by a hard, waxy, protective covering that is separate from their body, making them less susceptible to insecticide spray treatments
2. Effective treatment of crawlers requires accurate timing
3. Improper timing can encourage scale infestations by providing poor controls & eliminating beneficial insects
4. Typically remain in one place once they begin to feed
5. Three life stages: egg, nymph, and adult, appearing differently at each stage
6. Adults are 1/8 inch or smaller. Females are round or elliptical in shape; Males are smaller & are all elliptical in shape
7. Eggs hatch beneath the females
8. Feed on plant cells, causing stunted growth, yellowing, premature leaf drop, and even death -Host plants: wide variety of trees and shrubs



Oystershell Scales

Photo via Whitney Cranshaw, CSU

Current GDD: 5/13/25
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**Testing for
Scale
Viability**

Photo Credit: Steven K. Rettke
Rutgers Coop. Ext.

Pine needle scale (*Chionaspis pinifoliae*)



GDD Window (base 50): 298-448 (1st generation), 1290-1917 (2nd generation)

1. Overwinter as live females or bright red eggs beneath the wax cover of the dead female
2. Adult female is white, and oyster shaped, 1/8" long, and found only on needles
3. Adult males are small, winged insects that resemble tiny parasitic wasps and die after mating with females
4. **Crawlers are reddish, but turn yellowish tan, lose their legs, and never move again after settling**
5. **Settled crawlers secrete a waxy covering over their bodies**
6. Needles turn yellowish, then brown with eventual dieback
7. Foliage can look white to gray from a distance
8. Reduction in plant health, sparse foliage, and death of infested twigs
9. **Host plants: Pines (Scotch, mugo, Austrian, red, white), Norway spruce, Colorado spruce**



Photo via Ohio State Coop. Ext.

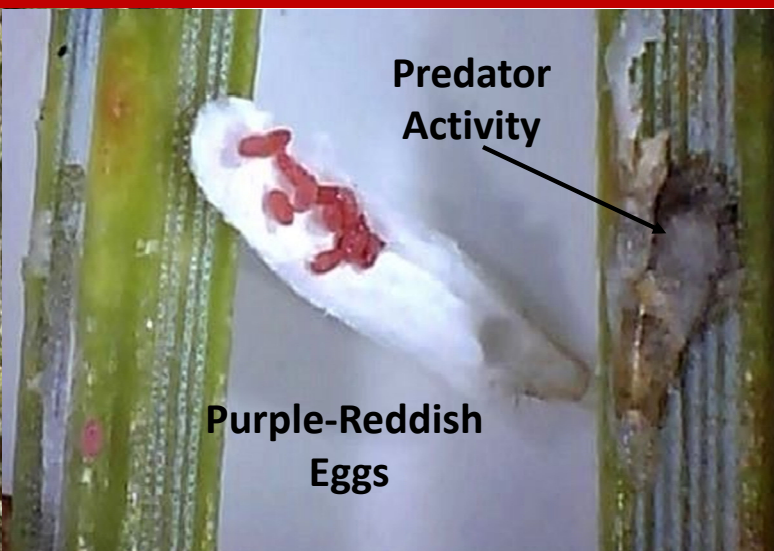
Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Pine needle scale (*Chionaspis pinifoliae*)

Photo credits Steve Rettke, Rutgers RCE

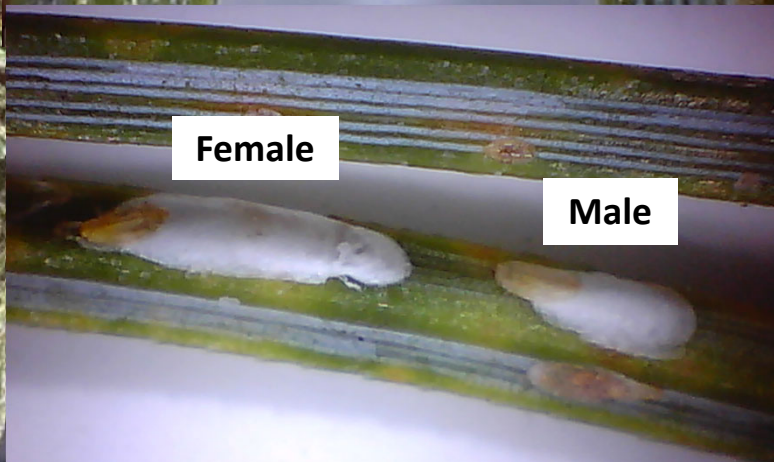


Extreme Infestation



Predator Activity

Purple-Reddish Eggs



Female

Male



Parasitoid Wasp Activity (exit holes)

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

**Pine Needle Scale
Infesting large
Mugo pine**



Photo Credit: Steven K. Rettke,
Rutgers Coop. Ext.

Elongate hemlock scale (*Fiorinia externa*)



GDD Window (base 50): 360-700 (1st generation)

1. Overwinters as egg or as female carrying egg
2. Females are oval, flat, and tan/translucent, males are whitish
3. **Females have a very long egg-laying period** which extends throughout the summer with two overlapping generations
4. Crawlers become noticeable in conjunction with new growth
5. **Puparium-like type of waxy cover extends under the body of the insect and over the top, making control difficult**
6. Causes yellow spots to appear on needles, foliage appears thin, needle drop, and **tree death in severe situations**
7. **Host plants:** hemlock, spruce, Douglas fir, yew, true firs

A pair of female Elongate Hemlock Scales



Photo via Steven K. Rettke, RCE

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Elongate hemlock scale

Photo credits Steve Rettke, Rutgers RCE



Male scales are smaller & have white waxy coverings that can obscure both sexes = Sexual Dimorphism

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

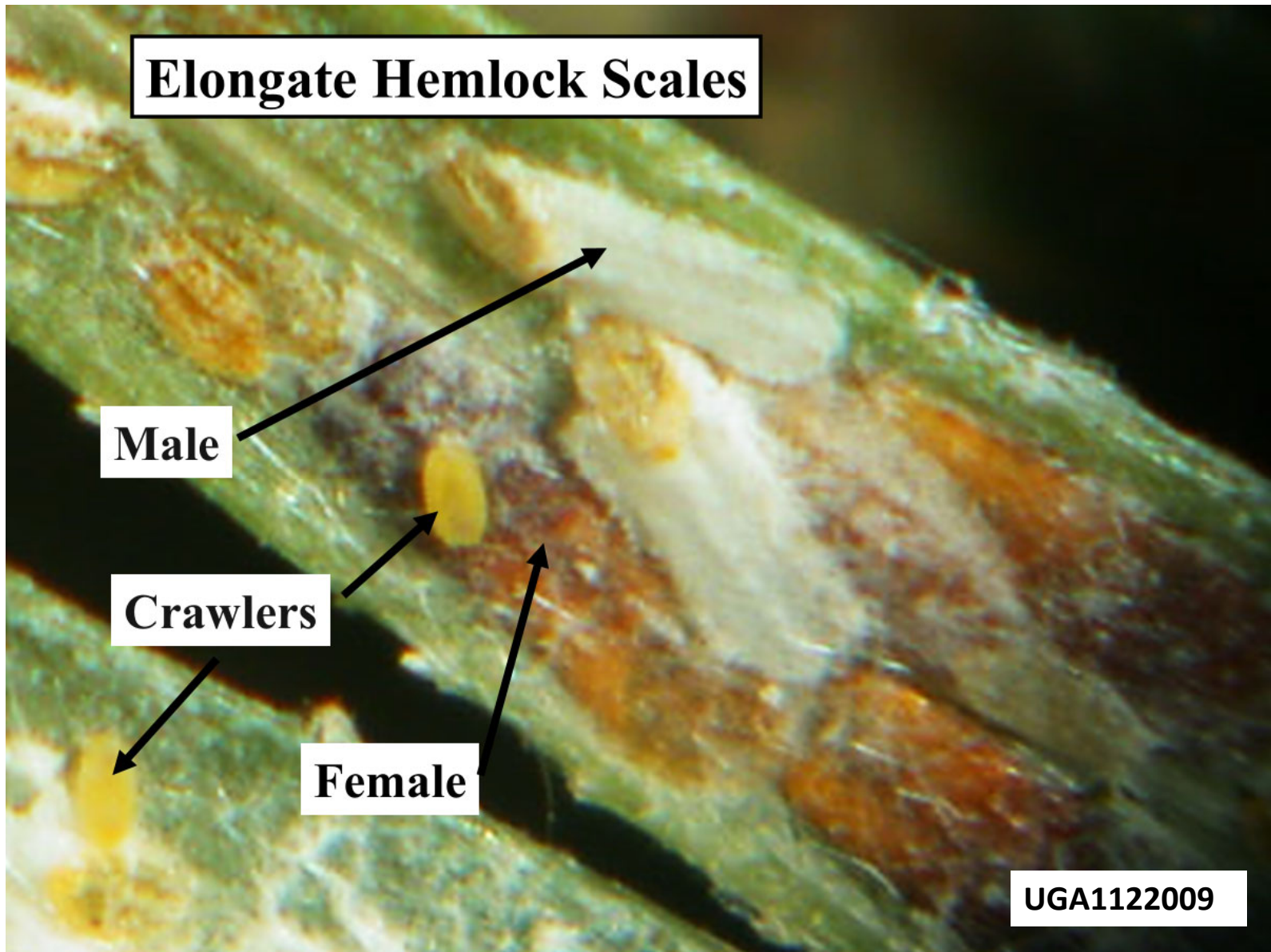
Elongate Hemlock Scales

Male

Crawlers

Female

UGA1122009



Oystershell scale (*Lepidosaphes ulmi*)



GDD Window (base 50): 363-707 (egg hatch & crawler emergence)

1. Overwinter as tiny white eggs under the waxy cover of the female
2. **Eggs hatch into pale yellow, less than 1mm long, crawlers**
3. Crawlers settle to feed & reach maturity in late summer/early fall
4. **This armored scale is among the most cold-tolerant of scale species**
5. Females are 3.0 mm long with a waxy cover, grayish brown, and resembling miniature oyster shells in shape and color
6. One generation per year in NJ
7. **Branches become encrusted with scales**
8. **Causes twig or branch dieback**
9. **Trees and shrubs can die if high infestations are not managed**
10. **Host plants: fruit trees**, beech, birch, maple, poplar, willow, & lilac and boxwood shrubs



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Oystershell scale (*Lepidosaphes ulmi*)

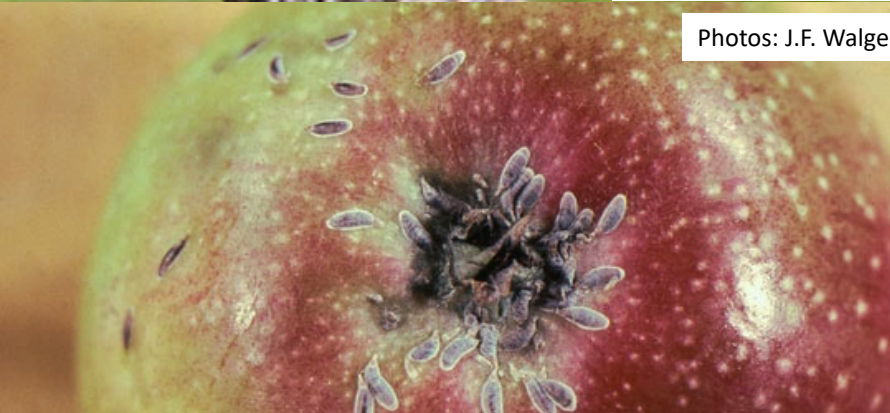
Photo credits Steve Rettke, Rutgers RCE



Photo: Jeff Hahn, UMN Extension



Photo: Whitney Cranshaw, CSU



Photos: J.F. Walgenbach, NC State



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Armored scales (*Diaspididae*)



GDD Window (base 50): 500-2200 depending on species

Management

- **Cultural Practices:**

- **Natural predators:** brown lacewings, green lacewings, lady beetles, **parasitic wasps**
- Keep growing areas and equipment clean
- **Prevent dusty conditions**
- Reduce plant stress
- Dispose of heavily infested plants

Materials

○ **Contact insecticides:**

- Carbamates [1A]: carbaryl
- Pyrethroids [3A]: -thrins
- Organophosphates [1B]: acephate (translaminar), malathion

○ **Considerations:**

- **Will harm non-target species**
- Timing is essential in controlling armored scales (target crawler stage before waxy covering forms)

○ **Systemic insecticides:**

- **Neonicotinoids** [4A]: dinotefuran, acetamiprid, thiamethoxam

- **Biorationals:**

- Insecticidal soaps and horticultural oils
 - Neem oil
- **Insect growth regulators:**
 - Pyriproxyfen [7A]
 - Buprofezin [16]

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Fourlined Plant Bug (*Poecilocapus lineatus*)

GDD Window (base 50): 90-1500

- Eggs overwinter in tender shoots and plant debris
- Nymphs hatch as small adults with black and yellow striped wing pads and begin feeding on succulent plant tissues by late-May
- Adults are small (3/16") and yellow with four stripes down their backs
- Adults will typically be found in the canopies of susceptible plants
- Feed by sucking plant sap, resulting in clusters of brown to black round spots that are sunken in on the leaves
- The spots can grow and merge to distort or damage entire leaves, and may turn translucent or become holes
- Heavy feeding on new growth can cause the plant to wilt
- Feeding stops by late-June and most plants will outgrow any damage
- **Host plants:** over 250 species of herbaceous and small woody ornamental plants



Photo: Sabrina Tirpak, Rutgers PDL

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Fourlined Plant Bug (*Poecilocapus lineatus*)



Photos: Sabrina Tirpak



Photos: UMN Extension



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Fourlined Plant Bug (*Poecilocus lineatus*)



GDD Window (base 50): 90-1500

Management

- Cultural Practices:

- **Natural predators:** birds, frogs, spiders, predatory wasps and larvae, jumping spiders, big-eyed bugs, damsel bugs, pirate bugs
- Sweep net sampling is best for scouting
- Prune infested leaves and remove debris
- Reduce plant stress
- Remove overwintering eggs
- Cut back growth in the fall

Materials

○ Contact insecticides:

- Pyrethroids [3]: -thrins
- Carbamates [1A]: Carbaryl
- Organophosphates [1B]: malathion

○ Systemic insecticides:

- Neonicotinoids [4A]: acetamiprid

○ Considerations:

- Will harm non-target species
- Timing of treatment is essential

- Biorationals:

- Insecticidal soap
- Horticultural oils

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Needle cast diseases

- There are many diseases that impact conifer foliage
- Particularly harmful to Douglas fir and spruce trees
- Causes needles to turn brown, yellow, or purple, and eventually drop prematurely, leading to sparse or bare branches
- **Stressed trees are more likely to suffer – can lead to death**
- Makes trees more susceptible to other pests and diseases
- **Symptom development often not observed until next season**
 - New growth is infected, lifecycle completes following season, and is ultimately 'casted' from tree



Rhabdocline needle cast

- Foliage disease caused by fungi in the genus *Rhabdocline*
- Primarily impacts needles of Douglas-fir (*Pseudotsuga menziesii*) from seedling stage to 30 years of age
- Outbreaks are associated with abnormally cool temperatures and high precipitation in the spring and summer months
- Severity of the disease is linked to closely spaced trees
- Symptoms appear in late fall or early winter and include yellow spots or flecks on needle surfaces
 - o The spots gradually get bigger and turn reddish brown
 - o Symptoms are most severe on the lower portion of the tree
- In late spring, fruiting structures of the fungus develop on the lower surface of the needle below the epidermis
 - o Epidermis splits open and exposes fungal spores, which are spread by wind and rain



Photo via UMass Extension

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Rhabdocline needle cast

Photo credits Steve Rettke, Rutgers RCE



Photo via UMass Extension



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Swiss needle cast

- Fungal disease caused by the fungus *Nothophaeocryptopus gaeumannii* (aka: *Phaeocryptopus gaumannii*)
- Impacts Douglas-fir
- Growth and symptom development is favored by wet environmental conditions
- Needles become discolored (blotchy yellow or completely yellow) and then brown from the tips before dropping prematurely
- **Older needles are more susceptible than younger ones, so infected trees may be bare except for the new growth**
- Small, black reproductive structures of the fungus can be seen in two bands on the underside of the infected needles (**hand lens!**)
- Infected needles cannot be cured so treatments will only prevent additional infections



Photo via UW Extension

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Swiss needle cast

Photo credits Steve Rettke, Rutgers RCE

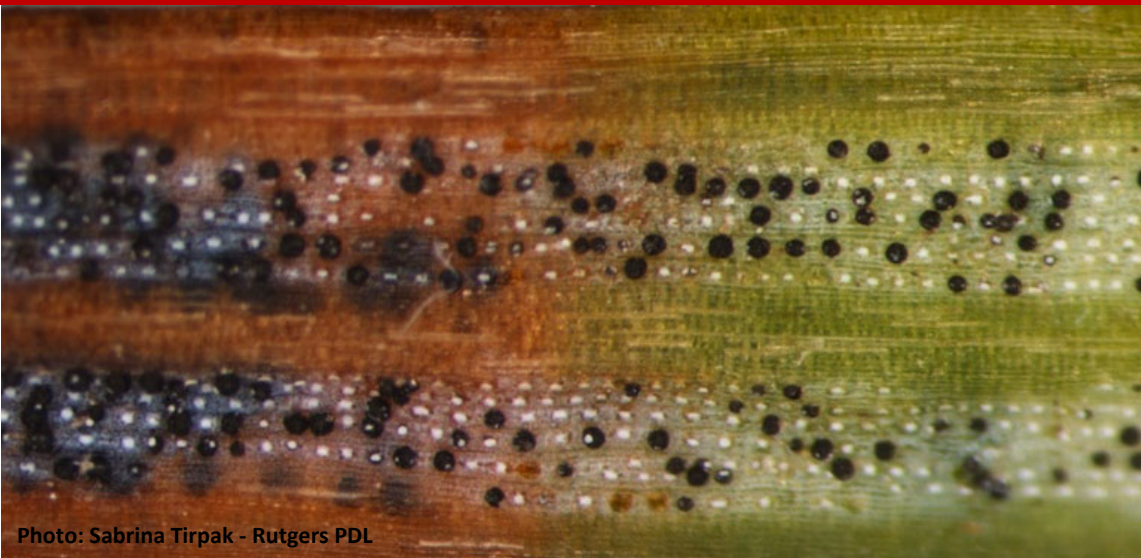


Photo: Sabrina Tirpak - Rutgers PDL



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Rhizosphaera needle cast

- Caused by several fungus species in the genus *Rhizosphaera*
- Impacts spruce trees
 - o Specifically, Colorado blue spruce, white spruce, and Oriental spruce
 - o Norway and red spruce are more resistant
 - o True fir, pine, hemlock, Douglas-fir, and true cedar can be impacted
- **Trees are more susceptible when stressed by drought, or when air flow is limited and shade causes prolonged periods of wetness**
- Fungus invades needles through stomata and overwinters in diseased needles. Symptoms can take 12+ months to develop.
- Spores are dispersed from spring through autumn by wind and rain
- **Needles on interior branches in lower canopy are infected first, gradually spreading upwards**
- Needles appear purple, then brown, then straw-colored before dropping prematurely
- Black fruiting bodies develop on needle surface



Photo via Steve Rettke, Rutgers RCE

Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Rhizosphaera needle cast

Photo credits Steve Rettke, Rutgers RCE



Photo: N. Brazee



Current GDD: 5/13/25
North NJ: 280 GDDs
Central NJ: 370 GDDs
Southern NJ: 460 GDDs

Needle cast disease management



Management

- Cultural Practices:

- Inspect stock being planted
- Remove severely infected tree prior to crop bud break (30%+ infected)
- Prune infected branches during DRY weather, disinfect pruning tools between cuts
- Avoid overhead irrigation
- Promote air circulation
- Mulch to moderate soil temperature
- **Fertilize** to support tree's natural defenses (not too much N though!)
- Reduce plant stress

Materials

○ Contact fungicides:

- **Chlorothalonil [M05]**
- Mancozeb [M03]
- Coppers [M01]

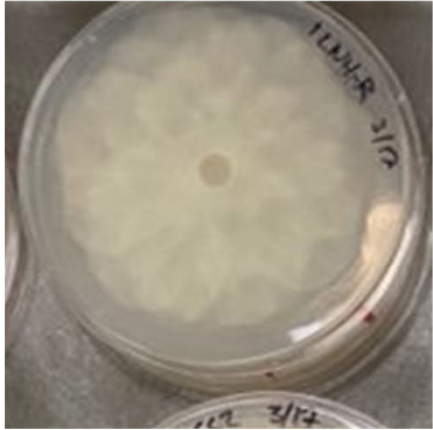
○ Translaminar / Systemic fungicides:

- Propiconazole [3]
- Azoxystrobin [11]
- Thiophanate-methyl [1]
- *Combination products*

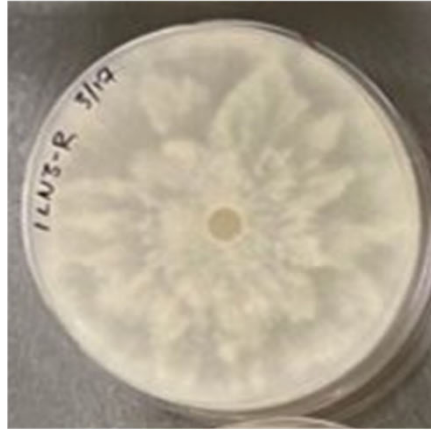
○ Considerations:

- First application in the spring when candles half-elongated / ½"
- Second application 2-3 weeks later (*unless high pressure/wet, then 10-14d later*)
- Continue applications every 2-4 weeks (total of 3-5 sprays)
- Total # of applications depend on history of disease severity
- Cover needles thoroughly for effective treatment
- Canopy penetration is critical
- Must follow allowable Ai/acre

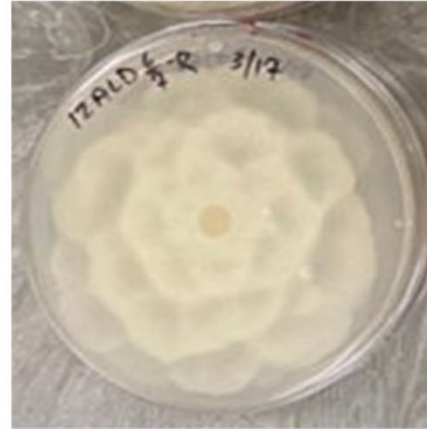
Root disease oomycetes



Pythium



Phytophthora



Phytophthora

Note:
Downy mildews
are foliar
Oomycetes

These are NOT fungi**

- ...but called 'water molds'
- Cell walls are *cellulose* based, not chitin based like fungi & insects
- Require Oomycete specific materials [Oomycides]

Oomycete root symptoms



- **Often no root hairs** / thick roots
- **Dark discoloration**
- **Outer root tissue sloughs off easily**
 - ‘Sheath pulls off easily’
 - AKA ‘Rat tail’
- Sunken cankers on roots
- ***Dig around*** – *if you pull sapling the diagnostic roots will pull off*
- Brittle, break easily

Phytophthora / Phytophthium symptoms

*Slow decline **or** rapidly apparent death*

Photos: Tim Waller – Rutgers Cooperative Extension



Leaves / Needles – turn straw, cinnamon brown (***stay on***), *curl*

Branches – Single, groups, all, discoloration starting near crown

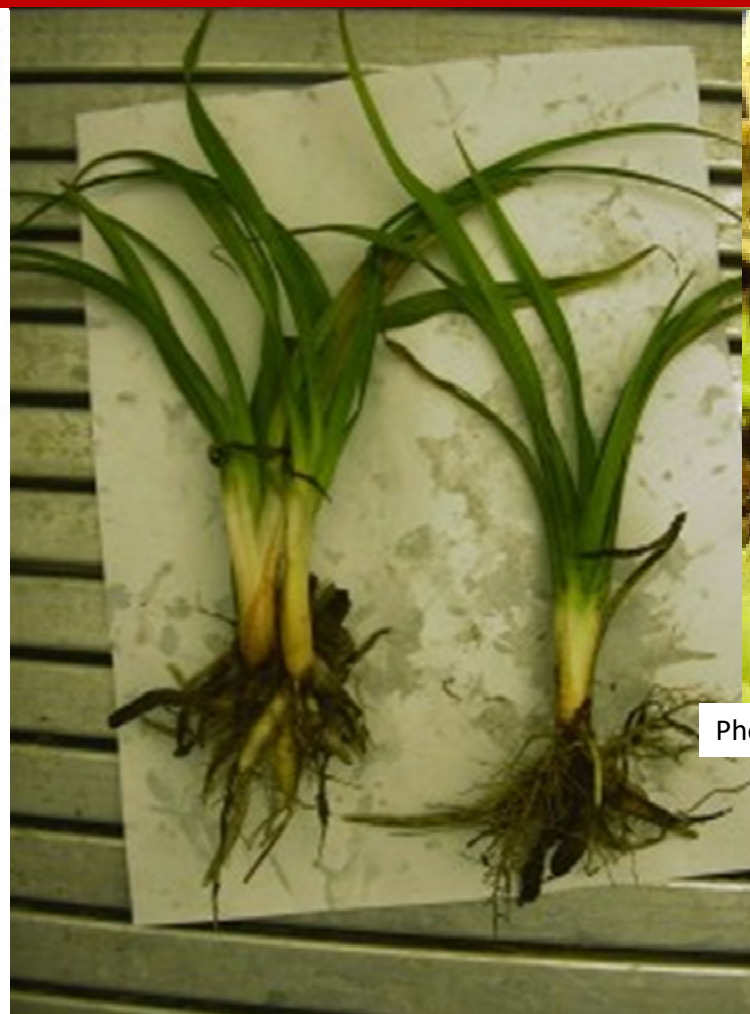
Stem – Cankers, wood dark streaks, bark pulling away

Resembles drought/nutrient stress – *watering/fertilizing makes it worse!*

Pythium symptoms



Plants of same age but one (left) has *Pythium* root rot.



Photos: MSU Extension



Photos: PSU

Rot at the stem base.

Current GDD: 4/22/25
North NJ: 60 GDDs
Central NJ: 120 GDDs
Southern NJ: 165 GDDs

Root Oomycete Management



Management

- Cultural Practices:

- **Inspect plants before planting them**
- Ensure proper sanitation practices for equipment, benches, and floors
- Improve soil drainage and reduce instances of standing water
- **Avoid over watering**
- Increase soil organic matter content
- Remove and destroy infected plants
- Replace infested soil
- Plant resistant varieties
- Soil solarization
- Use wood chip mulch
- **Crop rotation / site rotation**

Materials

○ Protectant & Local translaminar

- Cyazofamid [21]
- Dimethomorph, Mandipropamid [40]
 - (and combinations)

○ Xylem Mobile Systemic (upwards):

- **Mefenoxam [4]**
- Fluopicolide [43]
- Fenamidone [11]
- Oxathiapiprolin [49]

○ **Amphimobile / Fully systemic**

- Aluminum tris (O-ethyl phosphonate) **[P07]**
- Mono- and di- potassium salts of phosphorus acid **[P07]**

- Biorationals:

- *Streptomyces lydicus* [BM02]
- *Trichoderma asperellum* [BM02]
- *Bacillus subtilis* strain QST 713 [BM02]
- Hydrogen peroxide and peroxyacetic acid [NC]
- Quaternary ammoniums

ROTATION IS CRITICAL

*Root Oomycide
Considerations (2025)*



Thank you for attending



Presentation will be available on our website.

Next session: May 27, 2025

Key pests for next time:

- | | |
|--------------------------|--|
| 1. Euonymus Scale | 7. Peach Tree Borer |
| 2. Cryptomeria Scale | 8. Black Vine Weevil |
| 3. Japanese Maple Scale | 9. Bagworm |
| 4. White Prunicola Scale | 10. Volutella Blight in <i>Buxus</i> |
| 5. Juniper Scale | 11. Powdery Mildew vs. Downy Mildew |
| 6. Bronze Birch Borer | 12. <i>Cercospora</i> vs bacterial leaf spot
in hydrangea |
| 7. Emerald Ash Borer | 13. Scale tapes |

Funding provided by:



National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

Implementation of IPM in New Jersey
-Ornamental Crops 2025

Use the Rutgers Plant Diagnostic Lab

Enables us to learn more about specific issues

Mechanical
damage

Abiotic /
Environmental

Physiological /
nutritional /

Arthropod
pest

Disease



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Agriculture and Natural Resources
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Beta-version 2023
Contact: twaller@njaes.rutgers.edu

Nursery & Landscape Pest Scouting
Scouting with growing degree-days



Rutgers Green Industry Working Group

Contact: Timothy Waller, Ph.D.

twaller@njaes.rutgers.edu

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