



# Ornamentals & Turf

*Department of Entomology*

## SCALE INSECTS ON SHADE TREES AND SHRUBS

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Scale insects are common pests of shade trees and shrubs. More than 60 different kinds occur in Indiana, yet they are often overlooked or ignored until tree or shrub branches “mysteriously” start to die. Upon closer examination, these branches are likely to be covered with small bumps that are actually scale insects. They damage plants by sucking out plant juices.

From a damage standpoint, there are two types of scales, those that excrete a sugary liquid (honeydew), and those which do not. Honeydew is both a nuisance and a threat to plant health. Parked cars, walks, and benches beneath infested trees often become a sticky mess. The sugary liquid attracts ants, flies and wasps. Plants become unsightly when this liquid becomes a food for a black fungus called sooty mold. This mold can shade leaves and reduce plant growth.

**Soft (Lecanium), kermes, and bark** scales produce honeydew. These scales feed directly on plant parts that transport fluid and nutrients. **Armored scales** and **pit scales** do not produce honeydew. The armored scale's straw-like mouth moves like a plumber's snake to burst plant cells and feed on their contents. Pit scales are likely to do the same to the raised plant tissue that surrounds them.

### GENERAL SCALE LIFE CYCLE

Scales spend most of their lives feeding on the same spot of a plant, and unable to walk. After the eggs hatch beneath females the young scales are called **crawlers** because they can walk at this time. Crawlers are small (<1/32") and flattened, looking like dust on the plant surface. Scale infestations spread when crawlers walk or are blown by the wind to nearby plants or plant parts.

After an **armored scale** crawler begins to feed, it becomes very flat and covered with a clear wax shell. As it continues to grow, it remains beneath its waxy armor. This armor is difficult to penetrate with insecticides. Winged males crawl out from beneath their cover and mate with covered females who produce eggs. Females can produce about 100 eggs each.

**Soft scales**, are not covered by a waxy shell. Crawlers that hatch from eggs in mid-summer will usually crawl directly to leaves. They spend most of the summer feeding on leaves and excreting honeydew. They return to the twigs and bark where they spend the winter as settled second stage scales. They continue to grow on twigs in the spring until winged males mate with wingless females, who swell with up to 1,000 eggs.

### CONTROL MEASURES

#### Inspection

Check plants for live scale infestations. Flip over suspicious looking bumps on twigs and branches with a thumbnail. Bark is usually intact beneath a scale. When a soft body is beneath a cover, the plant is likely to have live **armored scales**. When the bump itself can be squashed it is likely to be some other type of scale. When honeydew falls from a tree, leaves should be inspected for live **soft scales** or mealybugs.

#### Cultural Control

Scales will thrive on trees that are under stress. Plant trees that are correctly suited to your landscape site. Slower growing plants with variegated leaves can require more care. Keep them watered. Carefully inspect newly purchased plants for scales. If a twig is unusually bumpy and leaves are somewhat yellowed it may have scales.

If a plant is normally a rapid grower, such as red-osier dogwood, or wintercreeper euonymus, consider cutting out heavily infested branches with a pruning shears to foster growth of uninfested shoots.

#### Biological Control

The stationary life of scales makes them easy targets for many natural enemies including lady beetles and microscopic wasps. These beneficial insects can keep the numbers of scales quite low in a natural woodland setting. For more on biological control please visit <<http://www.cips.msu.edu/hcr125/GuideScales.htm>>.

**Chemical control**

Conventional pesticides cannot penetrate a scale's tough skin or waxy cover. Scale crawlers are killed by these pesticides when they are covered during foliar application, or as they walk along treated surfaces. To achieve maximum kill, pesticides in this group should be sprayed at the beginning of the crawler period. Several obstacles make conventional materials undesirable for managing scales. Thorough coverage on tall trees is difficult and these materials do not kill scales after they settle. More importantly, these materials kill the scale's natural enemies responsible for lasting control in the landscape. Soil-applied systemic insecticides may have less of an impact on natural enemies but some are only effective on scales feeding on leaves, or those that are actively producing honeydew.

Conserve scale natural enemies and kill scales on infested trees by using a biorational material like *horticultural oil*. This material works by smothering scales. Unlike other conventional pesticides, this material can kill scales

after they have settled *while the scale body is still somewhat clear*. After it dries, it is not toxic to natural enemies that can fly back to an infested plant and feed on the remaining scales. When applied in winter at the dormant rate, horticultural oil kills scales that do not winter as eggs beneath the scale cover (See Table 1 for winter stage).

For persistent scale problems or those scales that winter in the egg stage (pine needle or oystershell scale) insect growth regulators can be a promising biorational alternative. Apply when scales are crawling or when the scales are still clear. These materials (e.g., Pyriproxifen) kill insects as they molt.

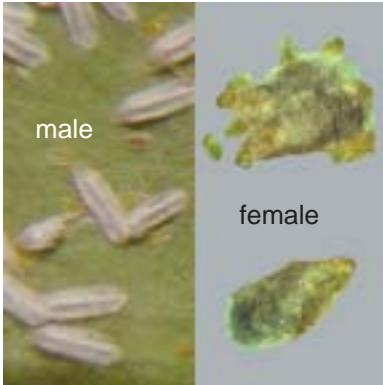
To get the most from both natural enemies and pesticides, do the following:

1. Identify the scale. Use picture sheet and Table 1.
2. Inspect plants for live scales in early spring and for active crawlers in summer.
3. Use Table 2 to make decisions about pesticide use, and Table 3 to select a pesticide.

TABLE 1. MOST COMMON SCALES OF INDIANA		
Kind and Description and of Scale	Plants Most Seriously Affected	Approx. Crawler Activity (winter stage)
<b>SCALES THAT DO NOT PRODUCE HONEYDEW</b>		
<b>Armored scales with dark covers:</b>		
<b>Obscure Scale</b> ( <i>Melanaspis obscura</i> ): Small (1/16"), round gray scales. Twigs appear covered with silver shells when rubbed. Black central nipple.	Pin-oaks, and red oaks, especially in urban areas	July (immature)
<b>Oystershell Scale</b> ( <i>Lepidosaphes ulmi</i> ): Small (1/8" long) gray or brown scales shaped like oyster shells. May completely encrust branches.	Lilac, birch, dogwood, ash, elm, poplar, soft maple, privet, willow, walnut, hemlock	May and July (egg)
<b>San Jose Scale</b> ( <i>Quadraspidiatus perniciosus</i> ): Tiny (1/16") gray circular scales about the size of a pinhead and having a yellow central nipple.	Flowering ornamental fruit trees, rose, quince, mountain ash, pyracantha, and others	Mid-June to mid-July (immature)
<b>Winged Euonymus Scale</b> ( <i>Lepidosaphes yanangicola</i> ): Small oystershell shaped (1/16") covers found along ridges of winged euonymus branches (Burning bush). Much thinner than oystershell scale.	Burning bush ( <i>Euonymus alatus</i> )	May, July, September (egg)
<b>Armored Scales with white covers:</b>		
<b>Euonymus scale</b> ( <i>Unaspis euonymi</i> ): Elongated (1/16") white ridged scale covers of males on leaves. Females on stems resemble oystershells but are more flattened.	Euonymus, pachysandra, bittersweet	Late May to early June, late July to August (adult female)
<b>Pine Needle Scale</b> ( <i>Chionaspis pinifoliae</i> and <i>C. heterophyllae</i> ): Small elongated (1/8") white scales attached to needles of evergreens. <i>C. heterophyllae</i> feed on pine only, while <i>C. pinifoliae</i> feed on other conifers as well. Can winter as egg, or adult female.	Pines, fir, spruce	May, July (eggs) June (adult female)
<b>Scurfy Scale</b> ( <i>Chionaspis furfura</i> ): Small elongate (1/10"), dirty white, pear shaped scales. Lie flat on bark. Purplish-red crawlers.	Young elms, apple, willow, dogwood	May, July (adult female)
<b>Juniper scale</b> ( <i>Carulaspis juniperi</i> ): Tiny (1/16") circular grayish-white scales with a yellow center. Packed between leaf scales of Juniper and arborvitae.	Juniper and arborvitae	Early May, late June (adult female)

**ARMORED SCALES:**

These insects are covered with a protective waxy covering. Once crawlers settle, they do not move. Some species have several generations per year. Eggs are laid under the waxy covering. **No honeydew is produced.**



Euonymus Scale (1/16")



Obscure Scale, female (1/16")  
Nipple off center, black when rubbed



Oystershell Scale (1/8")



Pine Needle Scale (1/8")



San Jose Scale (1/16")  
Nipple central, yellow when rubbed



Scurfy Scale  
(a-adult female, b-male)  
(fem. - 1/10"x1/20")  
(male - 1/10")



Juniper Scale (1/16")



Winged Enonymus Scale  
(1/16")

*SCALES WITHOUT COVERS:*

This group of insects does not secrete a scale-like covering. They are naked or covered with a cottony material. Commonly, there is a single generation. **Most species secrete a sticky honeydew** in which sooty mold grows. Golden oak scale does not produce honeydew.



Cottony Maple Leaf Scale (3/8")



European Elm Tree Scale (1/4")



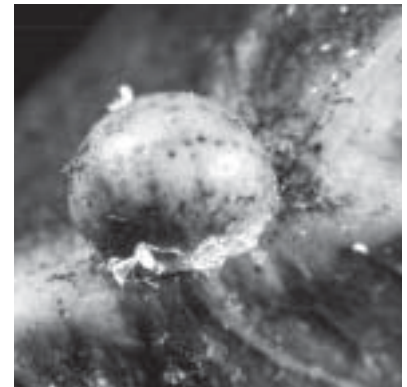
Fletcher's Scale (*Taxus Lecanium*) (3/8") on Aborvitae



Golden Oak Scale (1/8")



Magnolia Scale (1/2")



Oak Kermes (1/4")



Pine Tortoise Scale (3/8")



Taxus Mealybug (3/8")



Tuliptree Scale (3/8")



Hawthorn Mealybug on Hawthorn (1/4")

TABLE 1. MOST COMMON SCALES OF INDIANA (CON'T)

Kind and Description and of Scale	Plants Most Seriously Affected	Approximate Crawler Activity (winter stage)
<p><b>Pit Scales (Pit shaped bumps on twigs):</b>  <b>Golden Oak Scale</b> (<i>Asterolecanium variolosum</i>): This scale makes a circular pit (1/8") around its gold colored body. Edge of body is surrounded by a waxy fringe.</p> <p><b>SCALES THAT PRODUCE HONEYDEW</b></p> <p><b>Cottony Maple Scale</b> (<i>Pulvinaria innumerabilis</i>) (soft scale): Large (3/8") scales attached to undersides of branches. In spring, when depositing eggs, scales on twigs resemble strings of popcorn. Crawlers are found on the undersides of branches.</p> <p><b>European Elm Scale</b> (<i>Gossyparia spuria</i>) (bark scale): Oval-shaped (1/4"), reddish brown scales surrounded by a white waxy fringe. Found on bark, often in the crotch of small branches.</p> <p><b>Fletcher's Scale</b> (<i>Parthenolecanium fletcheri</i>) - formerly Taxus Lecanium (soft scale): Round (3/8") deep brown scales found on yews.</p> <p><b>Magnolia Scale</b> (<i>Neolecanium cornuparvum</i>) (soft scale): Large female up to 1/2 inch long. Skin is covered with white waxy powder.</p> <p><b>Pine Tortoise Scale</b> (<i>Toumeyella parvicornus</i>) (soft scale): Deep brown to black scales (3/8") with light colored spots in a pattern that gives them a turtle like appearance. If cream colored stripes are present, then it is the striped Pine Scale (<i>T. pini</i>). Life cycle of <i>T. pini</i> is poorly understood.</p> <p><b>Tuliptree Scale</b> (<i>Toumeyella liriodendri</i>) (soft scale): Females up to 3/8" long with orange ridges on a brown body. Black crawlers.</p>	<p>Oaks, especially pyramidal English oak</p> <p>Soft maple, boxelder, linden</p> <p>Elms of all ages</p> <p>Yew (Taxus)</p> <p>Magnolia only</p> <p>Pines only</p> <p>Tuliptree poplar, magnolia walnut, linden</p>	<p>June (adult)</p> <p>June (adult)</p> <p>Mid-May to mid-June (immature)</p> <p>Mid-June to mid-July (immature)</p> <p>September (crawler)</p> <p>Mid-June to mid-July (adult female)</p> <p>September (crawler)</p>

TABLE 2. ASSESSING THE SCALE INFESTATION<sup>1</sup>

Situation	Response	Comment
Live scales on plant in spring when plant is dormant.	Dormant season spray.	Low impact on natural enemies
<p>Live armored or pit scales on plant. Crawlers are present or have recently settled. <b>Some</b> new leaf discolor or branch dieback.</p> <p>OR</p> <p>Live honeydew producing scales on plant. Crawlers are present or have recently settled. <b>Some</b> new leaf discolor or branch dieback.</p>	Summer biorational spray.	<p>Low to moderate impact on natural enemies. Some parasitic wasps active at this time.</p> <p>Wash honeydew from cars, benches, and patios to manage honeydew nuisance.</p>
<p>Live armored or pit scales on plant. Crawlers are present or have recently settled. New leaf discolor or branch dieback is <b>severe</b>.</p> <p>OR</p> <p>Live honeydew producing scales on plant. Crawlers are present or have recently settled. New leaf discolor or branch dieback is <b>severe</b>.</p>	Summer conventional spray.	High impact on natural enemies. Do not use in combination with summer systemic spray.
Live honeydew producing scales on plant. Scales are feeding on leaves. New leaf discolor or branch dieback is <b>severe</b> .	Summer foliar systemic spray, or systemic soil insecticide.	High impact on natural enemies. Most effective soon after crawlers arrive on leaves. Soil applied systemic kills all feeding stages of honeydew producers, or stem feeding scales.

<sup>1</sup>Always conserve natural enemies when plant health and customer satisfaction can be maintained.

TABLE 3. CHEMICAL RESPONSES TO SCALE INFESTATIONS				
Response	Insecticide	Use in 1 Gal.	Use in 100 Gal.	Comment
Dormant season sprays	Superior oil (Sunspray, Volk oil, Clean Crop, Scalecide, and others)	2.5 oz. or 5 Tbsp.	3 gal.	Use before spring growth when temperature is above 40° F. Do not follow with Captan, Pyrene, Karathane, or Morestan, Sevin, or Cygon for 1 month. Use ultrafine oil at low rate for soft maples. Can temporarily remove "bloom" from blue-needed conifers.
	Ultra-fine oil (Ultra-Fine, Sunspray 6E Plus, Rockland, and others)	4-5 oz. or 8-10 Tbsp.	3-4 gal.	
Summer biorational spray (soon after crawlers settle, while they still appear clear)	Ultra-fine oil (Ultra-Fine, Sunspray 6E Plus, Rockland and others)	2.5 oz. or 5 Tbsp.	2 gal.	Can temporarily remove "bloom" from blue-needed conifers. Drought stressed plants, dwarf Alberta spruce and soft maples can be sensitive. Do not follow with compounds as listed above. Avoid spraying on wet foliage.
	OR Pyriproxifen (Distance)	-	1-1.5 cups	
Summer conventional spray (when crawlers are active)	deltamethrin (Deltaguard)		4-8	For licensed applicators only.
	malathion (Malathion 57EC) OR	4 tsp.	2 pts.	Injury may occur on hickory, viburnum, lantana and elm.
	acephate (Orthene 75S) OR	2 tsp.	10 oz.	May injure some crabapples and viburnums.
	lambda-cyhalothrin (Battle WP, Scimitar WP) OR	-	1.5-5 fl. oz.	For licensed applicators only.
	bifenthrin (Talstar 10WP) OR	2 tsp.	2 1/4 cup	For licensed applicators only.
	cyfluthrin (Tempo, Decathalon)	See label	See label	For licensed applicators only.
Summer foliar systemic spray	acephate (Orthene 75S)	2 tsp.	10 oz.	
	imidacloprid (Merit 75WSP)	See label	See label	
Systemic soil insecticide	imidacloprid (Merit 75WSP)	See label	See label	For licensed applicators only.
	imidacloprid (Bayer Tree and Shrub Concentrate)	1 oz./inch tree circumference OR 3 oz./foot of shrub height	-	For homeowner use.  Imidacloprid must be applied in spring one month prior to initiation of scale feeding. Most scales slow feeding when producing eggs or in dormant season.

READ AND FOLLOW ALL LABEL INSTRUCTIONS. THIS INCLUDES DIRECTIONS FOR USE, PRECAUTIONARY STATEMENTS (HAZARDS TO HUMANS, DOMESTIC ANIMALS, AND ENDANGERED SPECIES), ENVIRONMENTAL HAZARDS, RATES OF APPLICATION, NUMBER OF APPLICATIONS, REENTRY INTERVALS, HARVEST RESTRICTIONS, STORAGE AND DISPOSAL, AND ANY SPECIFIC WARNINGS AND/OR PRECAUTIONS FOR SAFE HANDLING OF THE PESTICIDE.

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