

Reading the Tree Leaves: Understanding Plant Damage to Identify Insect Pests in the Landscape

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1

Diagnostics: “Reading the Leaves”

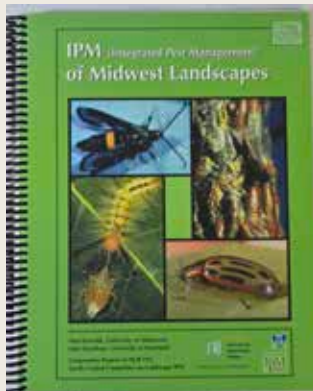
- Clues on plant → pest ID
- “Working backwards” is a valuable skill, but can be challenging!
 - Damaging insects may be gone / hard to locate
 - May be 2+ insects present and need to determine pest

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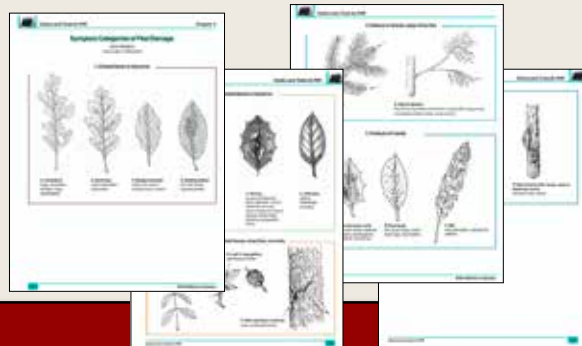
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IPM of Midwest Landscape Plants



<http://cues.cfans.umn.edu/old/ipmbook.htm>

Chapter 4: Symptom Categories of Plant Damage



3

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Anatomy Dictates Damage

- Insect anatomy dictates the type of damage caused to plants
- Mouthparts *usually* the structures involved
 - Rarely other parts or anatomy cause damage (e.g. ovipositor)
- Anatomy varies by type of insect (beetles, true bugs, etc.)
- Anatomy sometimes varies by stage of development
 - Ex. caterpillars vs. adult moths/butterflies

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4

Chewing Mouthparts

- Used to physically chew/cut off pieces of plant material
- Signs:** holes, notches, leaves gone entirely, etc.
- Also used by borers and leafminers

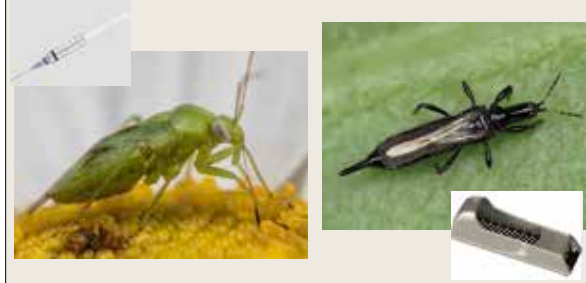
Key Groups:

1. Beetles
 2. Caterpillars
 3. Sawflies
 4. Ants/bees/wasps
 5. Grasshoppers
 6. Walking Sticks
 7. Earwigs
- Etc.



Sucking Mouthparts

- Used to drink liquids
- Can't chew holes if they wanted to!*
- Signs:** discoloration, speckling, curling/distortion



Key Groups:

1. True bugs
 - Aphids
 - Leafhoppers
 - Plant bugs
 - Lace bugs
 - Treehoppers
2. Mites (spider mites, etc.)
3. Thrips

Other Groups:

4. Adult moths/butterflies
5. Some bees/wasps
6. Mosquitoes

Host Plant Specificity

- Most herbivorous insects are specialists
- = *Only feed on certain plants*
- Generalists tend to be exceptions
- Knowing the host plant can be a valuable clue
- Host plant lists** available:
 - Book appendices, websites, publications

To be a good entomologist,
be a good botanist first!

Host Plant Lists:

UMN: IPM of Midwest Landscapes

INSECTS THAT FEED ON TREES AND SHRUBS

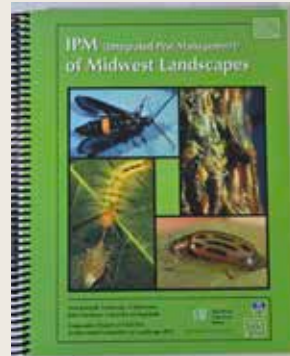
Ash Pests: A Guide to Major Insects, Diseases, Air Pollution Injury, and Chemical Injury

Garden Insects

Whitney Crabb

Main Insect Symptoms on Plants

1. Chewing on foliage, petioles, or twigs
2. Discoloration
3. Distortion of plant tissues
4. Dieback or dropping of plant parts
5. Other signs: droppings, cast skins, etc.



Chapter 4: Symptom Categories of Plant Damage

1) Chewing on Leaves, Needles, Petioles

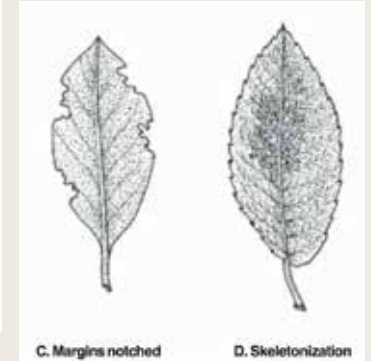
- Defoliation
- Shot Holes
- Notched Margins
- Skeletonization



A. Defoliation



B. Shot holes



C. Margins notched



D. Skeletonization

Defoliation: Large portions of leaves or entire leaves eaten away

Top Suspects:

1. Caterpillars
2. Sawflies
3. Others

Eastern Tent Caterpillar



Gypsy Moth Caterpillar



Elm Sawfly



Mountain Ash Sawfly



European Pine Sawfly



May/June Beetle



Post Oak Grasshopper



Northern Walking Stick

Shot Holes: Small holes within foliage

Top Suspects:

1. Small Caterpillars
2. Leaf beetles
3. General defoliators

Also consider:

- Shot hole diseases



Shot Hole Diseases



Oak Shothole Leafminer Adult Damage



Viburnum Leaf Beetle



Lily Leaf Beetle

Notched Margins: Small notches chewed out of edges of leaves

Top Suspects:

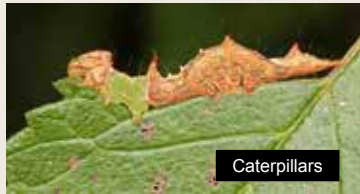
1. Weevils
2. Caterpillars
3. Sawflies



Green Immigrant Weevil



Black Vine Weevil



Caterpillars



Sawflies

Skeletonization: Lace-like damage; nibble around tough veins

Top Suspects:

1. Beetles
2. Sawflies
3. Caterpillars



Japanese Beetles



Oak Leaf Skeletonizer (Caterpillar)



Skeletonization Injury



Elm Leaf Beetle



Roseslug Sawfly

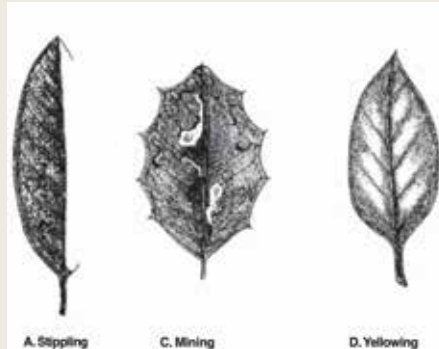


Scarlet Oak Sawfly

2) Discoloration

- Stippling/Speckling
- Leafmining
- Yellowing/Discoloration

- Plant diseases can sometimes cause similar symptoms!



A. Stippling

C. Mining

D. Yellowing

Stippling: Foliage has a speckled appearance; can resemble sandpaper

- Caused by sucking mouthparts

Top Suspects:

1. Lace bugs
2. Plant bugs
3. Leafhoppers
4. Aphids
5. Thrips
6. Spider mites

Up-close view of damage



Rose Leafhopper



Lace Bugs






Ash Plant Bug

Thrips

Up-close View of Thrips Damage to Foliage


Adult Thrips


Thrips Damage to Flower

Spider Mites

Two-Spotted Spider Mites & Eggs



Spider Mites Damage & Webbing



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17

Leafmining:


Tunnels, patches, blotches within foliage

- Tiny insects; use chewing mouthparts to tunnel within foliage
- Tend to be very host plant specific


Top Suspects:

- Caterpillars
- Flies
- Sawflies
- Beetles


Aspen Serpentine Leafminer (caterpillar)




Locust Leafminer (Beetle)




Elm Leafminer (Sawfly)



Boxwood Leafminer (Fly)



Arborvitae Leafminer (Caterpillar)



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18

Yellowing:

Foliage turns yellow / chlorotic


Top Suspects:

- Aphids
- Plant bugs
- Scales
- Leafhoppers
- Planthoppers
- Mites


Also consider:

- Diseases
- Fertility
- Abiotic factors

Potato Leafhopper & Plant Injury



Four-Lined Plant Bug (Adult)



Aphids




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19


3) Distortion

- Curling/Cupping
- Galls of leaves, twigs, flowers
- Plant diseases can sometimes cause similar symptoms!

A. Leaf cupping
boxwood psyllid, aphids



B. Leaf or twig galling
gall wasps and flies



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20

Curling / Cupping: Foliage becomes distorted; curled/cupped/twisted

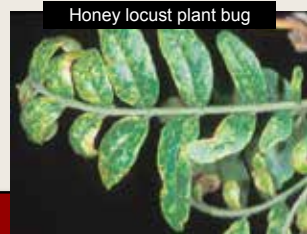
- Caused by insects with sucking mouthparts

Top Suspects:

- Aphids
- Plant bugs
- Leafhoppers
- Psyllids

Also consider:

- Diseases
- Herbicide injury
- Frost damage



Galls: Severe distortion of plant tissue caused by insects, mites, diseases

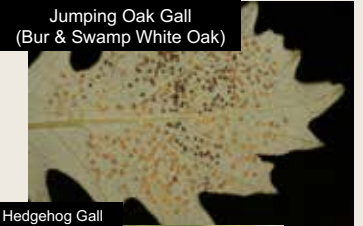
- Mostly a cosmetic issue; treatment usually not feasible
- Tend to be very host-plant specific!

Top Suspects:

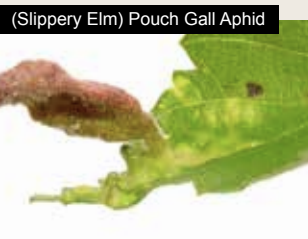
- Wasps (tiny!)
- Aphids & relatives
- Gall midges (flies)
- Mites

Also consider:

- Diseases



Galls caused by Aphids & Related Insects



Midge (Fly) Galls

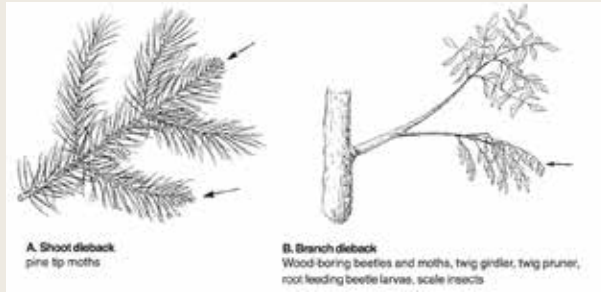


Eriophyid Mite Galls



4) Dieback or Dropping

- Shoot dieback
- Branch/Trunk Dieback
- Dropped plant parts



Shoot Dieback:

- May involve insect tunnels—check for exit holes, frass, etc.

Top Suspects:

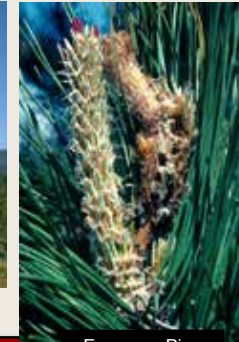
1. Caterpillars
2. Beetles

Also consider:

- Oviposition scars
- Diseases
- Mechanical injury



White Pine Weevil



European Pine
Shoot Moth (Pine)

Buffalo Treehopper
(Polyphagous)



Oviposition Scars



Dieback of Branches or Trunk

Top Suspects:

1. Borers
2. Scales

Also consider:

- Diseases
- Site conditions
- Girdling roots
- Physical injury



Dieback due to heavy
infestation of oystershell scale



If signs of borers found:

- Host plant
- Location on plant
- Size/shape of exit holes
- Presence of frass
- Time of year

Dropped Plant Parts

Top Suspects:

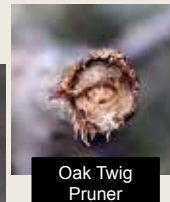
1. Borers
2. Squirrels

Also consider:

- Site conditions
- Weather conditions
- Self-pruning (cladoptosis)



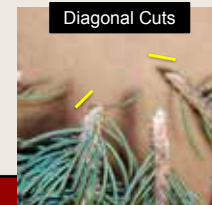
Twig Girdler



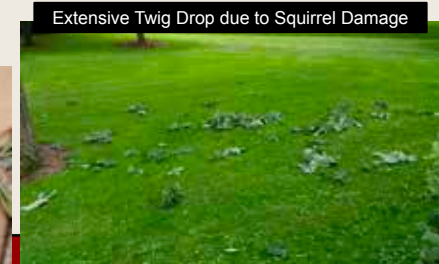
Oak Twig
Pruner



Maple Petiole Borer



Diagonal Cuts



Extensive Twig Drop due to Squirrel Damage

5) Other Signs

- Honeydew / sooty mold
- Frass / fecal spots
- Silk / cases / shelters
- Tunnels / exit holes
- Waxy coverings
- Exuviae (shed exoskeletons)



Frass from Clearwing Borer on Ground Near Trunk



Magnolia Scale, Honeydew, Sooty Mold & Scavenging Insects



Eastern Tent Caterpillar



Clearwing Pupal Case and Exit Hole



Zimmerman Pine Moth: Oozing Pitch

29

Questions?

30