

# Foliage diseases of Hardwood trees

Leaves of hardwood trees exhibit many symptoms:

1. **Leaf spot:** is characterized by usually discrete lesions that are at first discolored and then may become necrotic, turning brown or black as tissues die.
2. **Leaf blotch:** is similar to leaf spot except that the lesions tend to be larger, somewhat irregular, and not so clearly delimited.
3. **Anthracnose:** is even more extensive than blotch and is found on leaf margins, across and along veins, and often over the entire leaf.

# Foliage diseases of Hardwood trees

4. **Mildew:** is more sign than symptom. The fungi spread over the leaf surfaces, they produce spores and mycelia that appear white and powdery.
5. **Leaf blight:** is characterized by general and rapid killing of the leaf.
6. **Scorch:** is the burning of leaf margins and tips of leaves and progress to leaf midrib.

And some minor symptoms:

Leaf blister, leaf curl, scab and sooty mold

# Septoria leaf spot

Causal agent: *Mycosphaerella populorum* and *M. populicola*

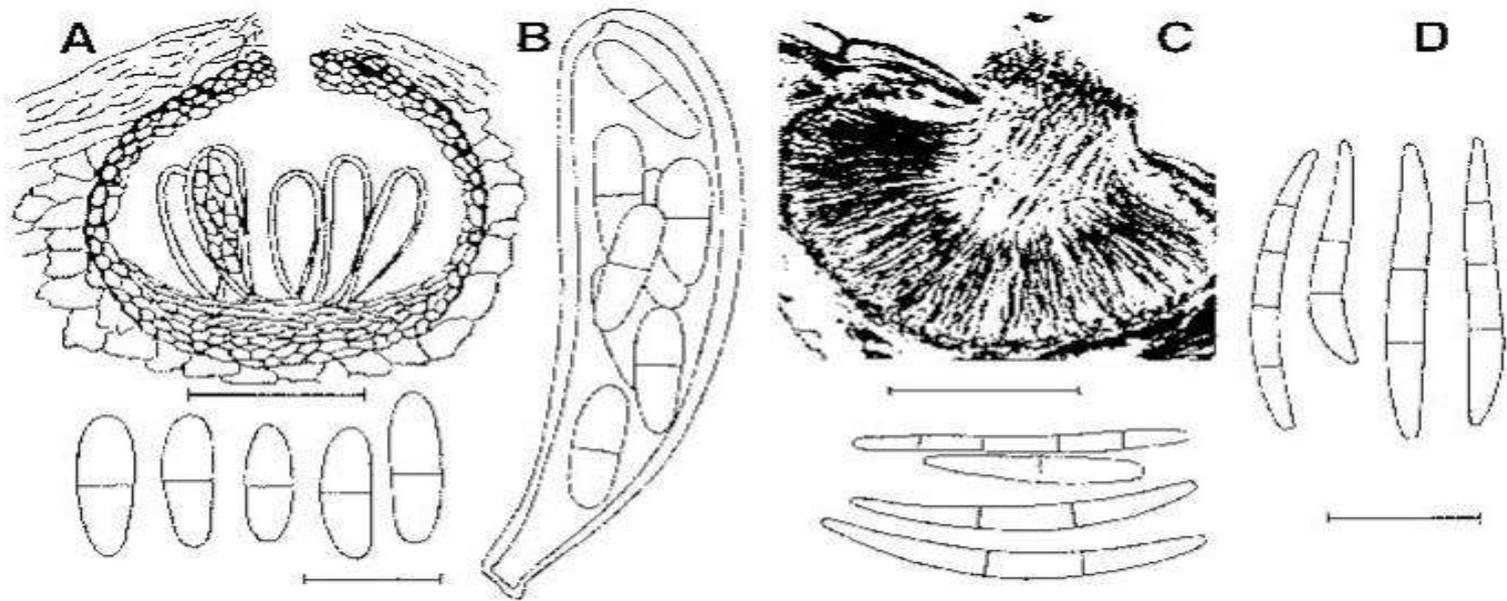


Figure 11. *Mycosphaerella populorum*. A. Section of pseudothecium. B. Ascus and ascospores. C. Section of pycnidium. D. Conidia. Scale bars = 50  $\mu\text{m}$  for fruit bodies, 10  $\mu\text{m}$  for other structures. A, B, D adapted from reference 3670 by permission of CAB International; C from reference 4017 by permission of the American Phytopathological Society.

## hosts:

All North American poplars and aspens are susceptible to *Mycosphaerella populorum*,

Hosts for *M. populicola* include black and eastern cottonwoods, balsam, poplar, and narrow leaf cottonwood.

*Mycosphaerella populorum* is more virulent than *M. populicola* and cause severe damage

## Foliar sign and symptoms

The appearance of Septoria leaf spots varies considerably between tree species and with time. Symptoms include, in early summer, a distinct tan circular spot with black margins and small black fruiting bodies in the center.

Finally in late summer, irregular brown to black spots that coalesce into large areas.

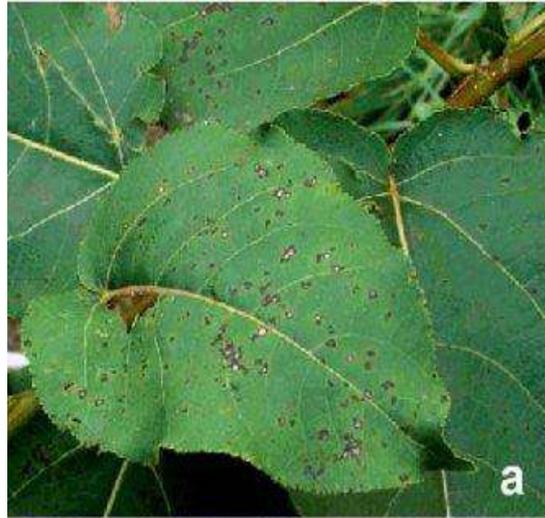
The spots are expected to cause a reduction in the tree's photosynthetic activity sometimes leading to premature defoliation



# Stem symptoms and signs

Perennial cankers induced by the fungus occur mainly on the stems and young branches leading to stem deformities, tree mortality, reduction in wood quality, tree growth and breakage of tree.

Pycnidia may be visible on young cankers but are rare on older cankers.



# management

- 1- Planting only resistant or tolerant clones.
- 2- Increasing spaces between trees to increase air circulation and reduce humidity.
- 3- destroying the infected overwintering leaves and stems because the fungus **overwinter as pseudothecia on fallen leaves and in infected branches and stems**
- 4- Applying fungicides

# Anthracnose

Anthracnose fungi typically overwinter in **infected leaves on the ground**, also in some cases overwinters in **buds, cankered branches** and **twigs** on the trees.

They can infect leaves, flowers, fruits and stem tissues in spring when new growth is emerging.

**Hosts:**

**Ash** : *Gnomoniella fraxini*

**maple**: *Discula* sp.

**Beech**: *Apiognomonia erribunda*

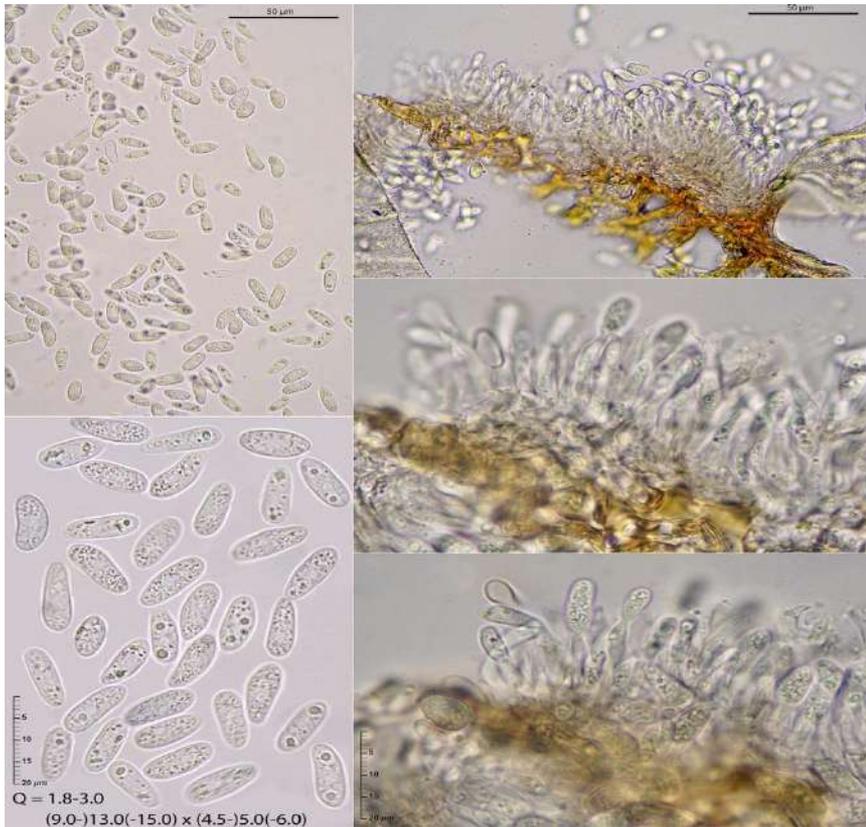
**sycamore**: *Apiognomonia veneta*

**Oak** : *Apiognomonia quercina*

**Elm** : *Stegophora ulmea*

Anthrachnose refers to disease caused by fungi that produce spores (**conidia**) in fruiting structures called (**acervuli**)

### Conidia of anthracnose fungus



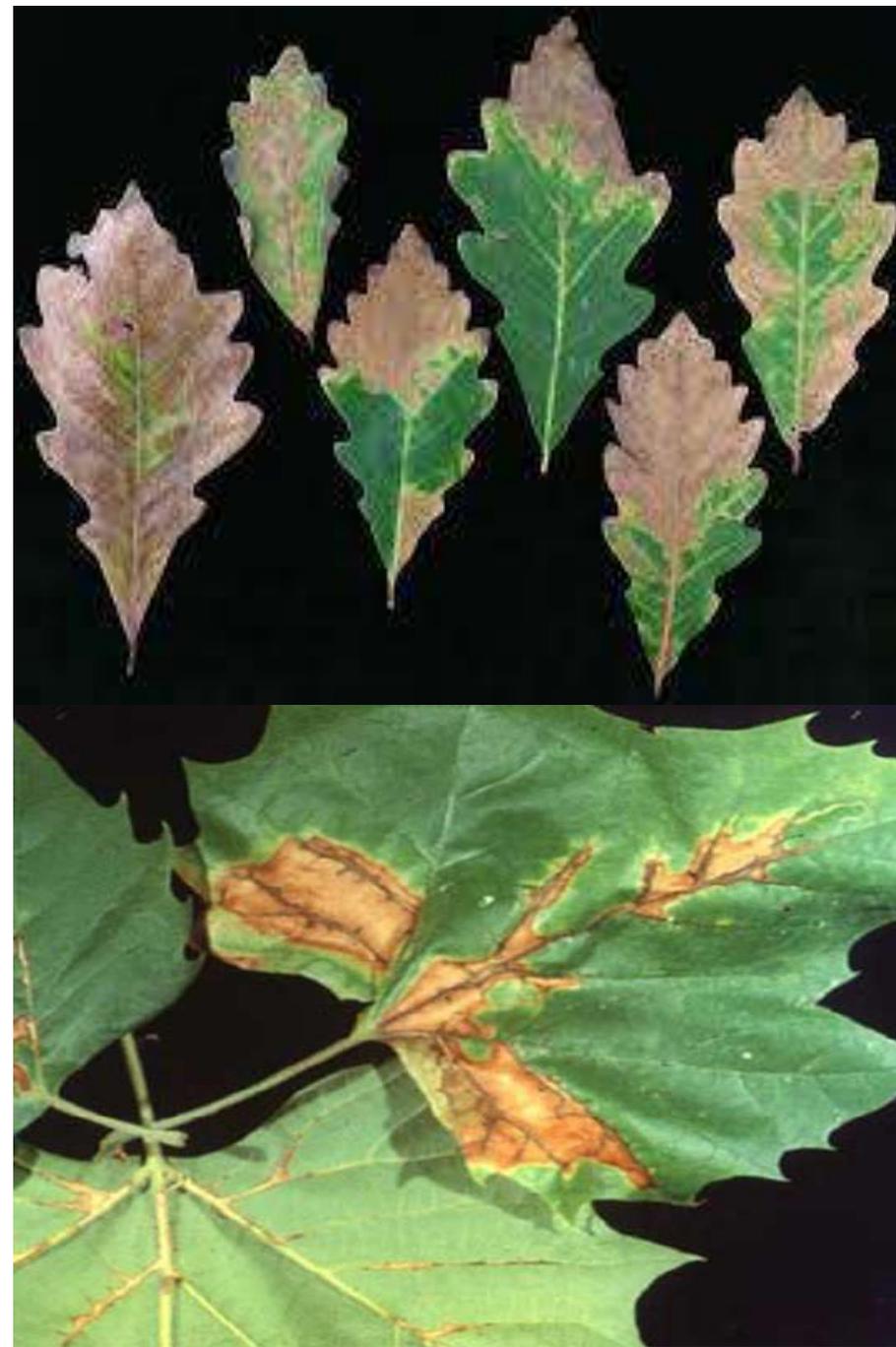
### Fruiting structure (Acervuli)



# symptoms

Symptoms on infected leaves vary from small necrotic spots to irregular lesions along veins, and often over the entire leaf.

Infected buds and twigs are killed during early spring and appear as though frost injured.



Branch cankers develop at the base of infected twigs, causing dieback.

Heavy infections often lead to premature defoliation and death of the entire tree.



# Management

- 1- Remove fallen leaves and twigs from the site. **Why ?**
- 2- Prune out dead twigs and branches and destroy them.
- 3- providing adequate space when planting and thinning tree canopies for air circulation and sunlight can help dry host material following wet weather, thereby reducing fungal infection.
- 4- Maintain health of trees by providing adequate water and fertilizer **can ensure trees do not become stressed**
- 5- Chemical sprays to control anthracnose such as **chlorothalonil, copper sulfate and mancozeb.**

# Maple tar spot

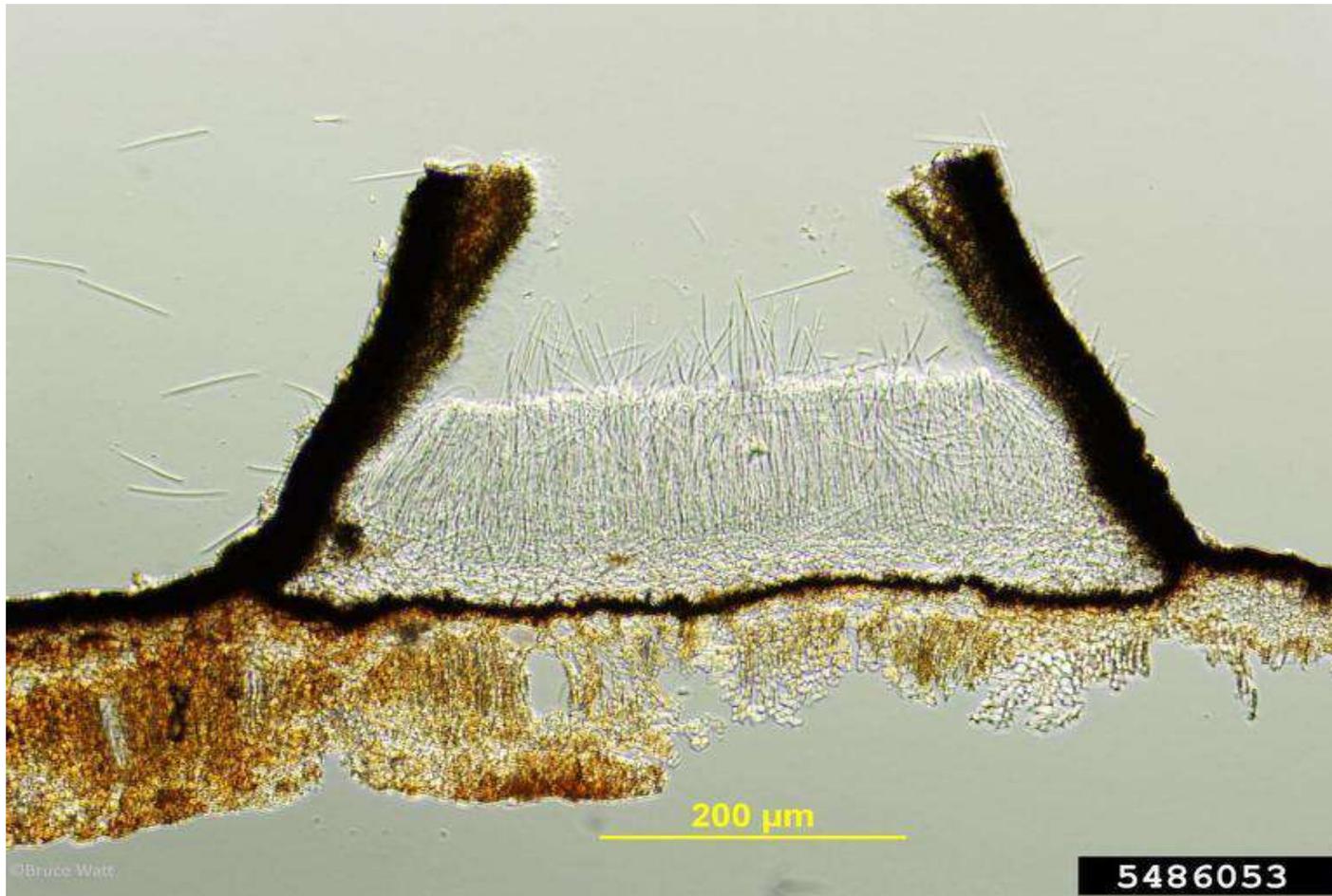
**causal agents** :*Rhytisma acerinum* and  
*R. punctatum*

*Rhytisma acerinum* produces large (up to 2 cm), irregularly shaped spots, whereas *R. punctatum* produce clusters of small (1mm) spots.

The fungi overwintered in (apothecia) in fallen leaves.

**Hosts:** mostly maple, willow and holly tree.

# Apothecium and spore emerging

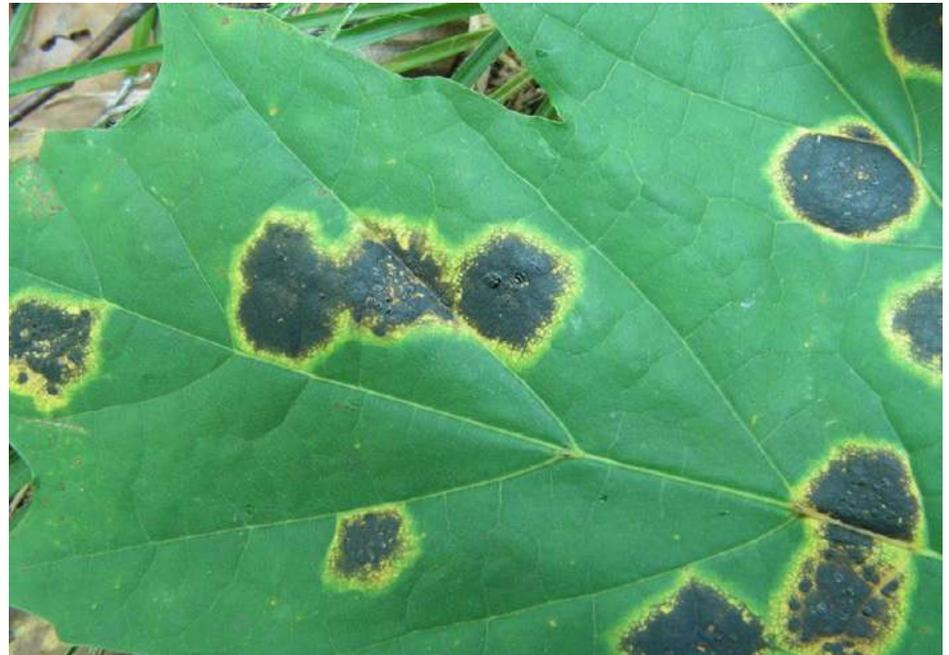


# symptoms

In late spring or early summer light green to yellow green spots appear on tree leaves.

These develop into brown-black lesions, retaining the yellow border.

The lesions continue to grow, and by the end of summer form leaf spots that look like tar.



# Maple tar spot



# management

- 1.Reduce the amount of diseases overwintering , rake up fallen leaves in the autumn and destroy or remove them from the yard .
- 2.Fungicide Application

## Powdery Mildew

**Causal agents** : Species of *Phyllactinia*, *Erysiphe*, *Microsphaera*, *Uncinula*, *Podosphaera*, and *Sphaerotheca*

### hosts:

aspen, cottonwood, willow, maple, oak, sycamore, elm and hawthorn

# symptoms

infected leaves look as though dusted with powder, the "dust" or "powder" is the pathogen itself and is a combination of mycelia and asexual spores growing on the leaf surfaces.

Some chlorosis may be seen in tissues beneath the fungus.

Occasionally, heavily infected leaves show symptoms such as discoloration, dwarfing, and distortion.



Tiny specks, first orange and later black, can be seen throughout the powdery material .

These are the sexual fruiting structures (cleistothecia) of the fungus.



# management

Remove all infected leaves, branches and fruits and destroy them by burning and plant debris to reduce overwintering or cultivation sites.

Increased sunlight in shaded gardens.

Improved air flow between crowded plantings also will decrease the incidence of powdery mildew.

Spray infected plants with effective fungicide such as sulfur or potassium bicarbonate.

# Bacterial leaf scorch

## pathogen: *Xylella fastidiosa*

### hosts:

- Oak
- Oleander
- Maple
- Sycamore
- Elm
- Hackberry

## Main symptom:

Symptom of the disease is a marginal leaf scorch started from the leaf tip and progress to midrib.



## Symptoms:

Affected leaves may curl, turn brown and drop prematurely, and as the disease progresses over several years, branches die and the tree declines.



**Glassy winged sharpshooter is the vector of the pathogen**



# Disease management

- 1- Use tolerant plants: In areas where BLS occurs, avoid planting highly susceptible trees.
- 2- Control of insect vectors: it reduce the spread of the disease.
- 3- Pruning: Pruning of infected branches can delay the spread of the disease.
- 4- Watering during drought periods may reduce moisture stress and possibly delay scorch development