



## Diplodia (Sphaeropsis) Tip Blight

The fungus overwinters in infected needles, cones, and woody tissue both on and beneath the tree. Damage includes shoot and branch injury.

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Shoots turning yellow green and then brown from *Diplodia*. Courtesy of Tracey Olson, PDA

*Diplodia pinea* (Desm.) J. Kickx f. (formerly *Sphaeropsis sapinea*)

During wet weather from March through September, the fruiting bodies mature and release brown, oval spores.

### Hosts

- Austrian, red, Scotch, and other two- or three-needled pines
- Rarely on Douglas-fir and spruce

## Damage Potential

- Moderate-high

## Symptoms and Signs

- Brown, yellow, gray, or straw-colored needles at tip of current season's growth; needles usually stunted and shoot may curl
- Branch dieback
- Small, black fruiting bodies on needles, cones, or shoot tissue

- Cankers on stems or branches
- Oozing resin that adheres to blighted needles

## Causes of Similar Symptoms

- Pales weevil feeding
- European pine shoot moth
- Nantucket pine tip moth
- Pine shoot beetle
- Scleroderris canker
- Winter drying
- Drought

## Identification

**Diplodia (formerly Sphaeropsis) tip blight is caused by the fungus *Diplodia pinea*. It is the most common and severe disease of pines in Pennsylvania and attacks trees of all ages. Tips of infected current-year shoots will blight. Needles on these dead tips are usually tan to straw colored, shorter than normal, and typically remain attached.**

**When the fungus attacks larger branches or the main trunk through wounds, misshapen tops and even branch or tree death can result. Cankers are generally found only on mature trees, while tip blight attacks trees of any age.**

**Trees are most susceptible to infection from the time buds begin to open until the needles are fully elongated. Once the fungus enters the needle, it kills that tissue very quickly. Symptoms are visible on the current season's growth and on second-year cones. Infected needles will be stunted, straw colored, and occasionally glued together with hardened resin. Cankers may be found on the first branch whorl of infected twigs. Beginning in late summer, minute, black, fruiting bodies (pycnidia) are visible with a 10X hand lens on needles, cones, and tissue found attached or unattached to the tree. Woody tissue beneath cankers is a light brown to amber color when bark is stripped away. If the wood beneath these cankers is gray to black in color, *Atropellis* may be present.**

## Biology and Life Cycle

The fungus overwinters in infected needles, cones, and woody tissue both on and beneath the tree (Figure 1). During wet weather from March through September, the fruiting bodies mature and release brown, oval spores (Figure 2). The spores are distributed by wind, water, animals, and people to the new growth, where they germinate on the needles. The fungus enters needles through the stomata or may enter branches through wounds caused by hail, insects, or pruning. The infection reaches the base of the needle in a matter of hours, leaving a small, brown lesion with a resin drop at the point of entry.



Figure 1. Mature fruiting bodies embedded in the needles. Courtesy of Joseph O'Brien, USDA Forest Service, Bugwood.org (#5051004)

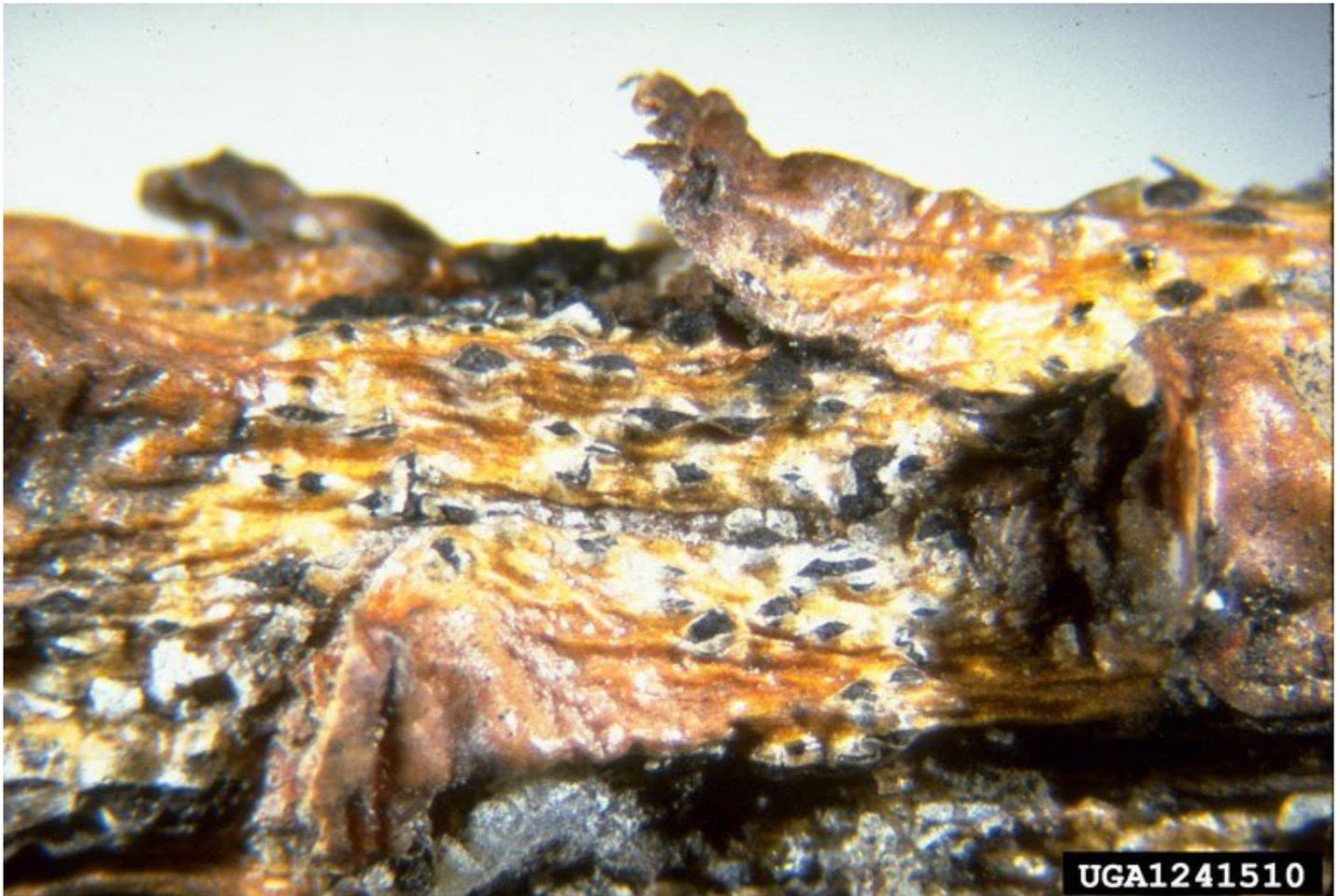


Figure 2. Fruiting bodies embedded in bark surface of twigs. Courtesy of John W. Schwandt, USDA Forest Service, Bugwood.org (#1241510)

The fungus continues to grow into the twig and results in browning of the attached needles and subsequent cankers on the twig (Figure 3). Needle elongation is diminished after infection and dying shoots turn yellow-green before becoming straw colored. A girdling canker is produced when the disease reaches twigs, branches, and the main trunk. This canker may also exhibit resin flow. Tissue above the canker dies and major portions of the tree may be killed as a result.



Figure 3. Canker causing twig girdling and leading to tip dieback. Courtesy of Tracey Olson, PDA

**In the second year, cones can become infected (Figure 4). While this does not harm the tree in any way, infected cones serve as a large reservoir of spores and contribute to the spread of the disease. This disease is present year-round.**



Figure 4. Infected second-year cones serving as a source of infectious spores. Courtesy of USDA Forest Service North Central Research Station Archive, Bugwood.org (#1406026)

**Douglas-fir and spruces have occasionally been observed with Diplodia tip blight (Figure 5). In most cases, this has been a result of unusual circumstances that have high disease pressure due to adjacent infected pines in windrows or nursery blocks.**



Figure 5. Diplodia infection on Douglas-fir. Courtesy of Tracey Olson, PDA

## Monitoring and Management Strategies

### Plantation Establishment

- Plant disease-free stock.
- Avoid planting susceptible species on sites where they may be more prone to insect injury, disease, or stressed conditions.
- Do not plant trees near an area that is already infected with Diplodia.

### Preseason

- Maintain tree vigor throughout the year with adequate water and fertilization.
- Mow weeds and area around trees to allow for air circulation. Avoid mower or string trimmer damage.

### Growing Season

- Control insects and other pests to reduce stress level of trees and potential infection sites from wounds created by feeding.

- Scouting:
  - Late spring/early summer: Randomly select 50 trees (of any age) and look for stunted, curled, or dead shoots of current-year growth. Tag or mark the trees.
  - In fall, scout tagged trees for fruiting bodies. Look beneath the fascicle sheath of needles that are straw colored or held in place with resin.
  - If more than 10 percent of scouted trees are unfit for sale due to Diplodia, consider treating the entire plantation with fungicide next spring.
- At the end of the season, evaluate results and update records.

## Control Options

### Biological

- No recommendations are available at this time.

### Mechanical

- Prune and remove infected material (twigs, branches, cones) during dry weather when fruiting bodies are not releasing spores. Remove and burn or bury pruned material.

### Biorational

- No recommendations are available at this time.

### Chemical

- Apply appropriate fungicide in early spring when candles begin to elongate. Continue applications at 1- to 2-week intervals until needles reach full size (usually two to four sprays).
- Note: Fungicide application will not protect seed cones from becoming infected. No recommendations are available at this time to prevent infection of seed cones.

### Next Crop/Prevention

- Prevent new foliage from becoming infected by using measures listed above.

