IDENTIFICATION & MANAGEMENT OF

Pumpkin Diseases

Richard Latin and Karen Rane
Department of Botany and Plant Pathology

IT may be difficult to imagine, but we receive more requests for information on pumpkin diseases and pumpkin disease control than on any other vegetable crop. Some of the requests arrive during the winter, when folks have had time to reflect on the previous season's problems and are anxious to avoid similar problems during the next growing season. Unfortunately, most of the calls occur in August and September and are prompted by the "sudden" appearance of collapsed canopies or rotting fruit.

Although some disease outbreaks are unforeseen, even by the keenest growers, most serious epidemics can be avoided by knowing which infectious diseases threaten the crop, recognizing their symptoms, and understanding how they spread and survive. This publication is designed to provide such information on the nature of several infectious pumpkin diseases.

Sclerotinia Rot

The Sclerotinia fungus affects a wide variety of crop plants. Many vegetables including tomatoes, beans, and carrots, as well as cucurbits, are susceptible. The pathogen produces resilient structures, called sclerotia, that survive in our soils indefinitely. Therefore, once an outbreak occurs in a field, the potential for future outbreaks will remain high. Sclerotinia rot is a cool season disease, hence its appearance on pumpkins in years when summer temperatures are below normal.

The most obvious symptoms of Sclerotinia rot occur on pumpkin vines (stems) and fruit. During periods of cool temperature and high relative humidity, a white, cottony mold develops around watersoaked infection sites (Figures 1 and 2). Solid, black sclerotia (see arrows) that are about the size of a watermelon seed are produced among the moldy growth.

FIGURE 1

FIGURE 2

Disease Characteristics

Pathogen survival: . . . . . • Fungal structures (sclerotia) in soil.
• Infested crop residue.

Pathogen spread: . . . . . • Wind dispersed spores produced on sclerotia.
• Mechanical movement of sclerotia.

Important environmental factor: . . . . . • Infection tends to occur in dead tendrils or through withered flowers still attached to developing fruit. Therefore, the disease is more likely to occur when extended periods of below normal temperatures and wet weather occur while flowering is abundant.

Disease Management

Disease resistance: . . . . . • None.

Cultural control: . . . . . • Rotations with non-host crops (cereal grains) will limit the potential for damage to subsequent vegetable crops.

Chemical control: . . . . . • Fungicides may be effective if applied to young plants that could be threatened during cool, wet summers.

Phytophthora Blight

Phytophthora blight has become one of the most serious threats to pumpkin production in midwestern states. Severe losses have been reported throughout the northeastern quarter of the U.S. during the last decade. The disease is caused by a fungal pathogen that infects many different vegetable hosts, survives in our soils indefinitely, and spreads quickly within and among fields in seasons with typical midwestern temperatures and rainfall patterns.

Symptoms on pumpkins often are discovered first on the surface of mature fruit, but vines of infected plants eventually collapse and die. The soft rot associated with a rapidly expanding area of white, cottony mold on any part of the fruit is a very characteristic symptom of the disease (Figures 3 and 4). Phytophthora blight has a very broad host range. All cucurbits, especially squash, are particularly susceptible. Tomatoes, most pepper cultivars, and eggplant also are susceptible.

FIGURE 3

FIGURE 4

Disease Characteristics

Pathogen survival:	• Resilient spores that survive in soils indefinitely. • Infested crop residue.
Pathogen spread:	• Mechanical spread with soil on farm implements. • Dispersal from plant to plant via splashing water and wind.
Important environmental factor:	• Phytophthora blight can be especially severe when late summer weather is cool and wet.

Disease Management

Disease resistance:	• No pumpkin or squash varieties have measurable resistance to Phytophthora blight. Some pepper cultivars have useable resistance.
Cultural control:	• Cultural practices such as long crop rotations may reduce severity for future crops. Avoiding fields that are poorly drained and have a history of the disease will serve as a deterrent to severe outbreaks. Practices aimed at avoiding standing water in fields will improve efficiency of fungicide applications by reducing disease pressure.
Chemical control:	• Protective fungicides such as chlorothalonil, mancozeb, and fixed copper may reduce yield losses caused by Phytophthora blight.

Bacterial Fruit Spot

Bacterial spot is a disease of cucurbits that is most often observed on pumpkins and other fall squashes. Summer squash and other cucurbits also are susceptible, but do not appear to be prone to severe epidemics. Bacterial spot infection results in small lesions on fruit surfaces that drastically reduce the market value of decorative pumpkins and squash. The disease does not result in premature collapse and decay of vines, and, except in very severe cases, is not primarily responsible for rotting fruit. Although the disease may receive very little attention in most years, occasional, severe outbreaks on jack-o'-lantern pumpkins can result in near total losses.

Symptoms on foliage are rather inconspicuous and difficult to distinguish. Leaf lesions are small, dark, and angular (Figure 5). They may grow together to cause a serious foliar blight. The most readily identifiable symptoms occur on fruit. Characteristic symptoms are small (1/16 - 1/4 inch), round, tan scabs that occur in clusters, often on the "face" of the jack-o'-lantern (Figure 6). The scab-like lesions (Figure 7) begin as tiny watersoaked spots on developing fruit. As fruit mature, the spots enlarge and give rise to tan, raised "blisters." The blisters eventually flatten as the lesion expands to its final size. On mature fruit, saprophytic fungi often colonize the dead, tan tissue at the center of the lesion. Lesions at this stage resemble symptoms caused by black rot and Fusarium diseases.

FIGURE 5

FIGURE 6

FIGURE 7

Disease Characteristics

Pathogen survival:
- Contaminated seed.
- Bacteria surviving in association with infested crop residue.

Pathogen spread:
- Bacteria are splash-dispersed to neighboring plants. Spread can be very rapid within fields.
- Long distance dispersal with contaminated seed.

Important environmental factor:
- Bacteria infect fruit through natural openings in young, rapidly expanding fruit, prior to the development of a thick, waxy cuticle.

Disease Management

Disease resistance:
- All pumpkin varieties appear to be equally susceptible.

Cultural control:
- Normal rotations with noncucurbit crops will help prevent serious early season epidemics, unless inoculum is introduced via contaminated seed. Use commercially distributed seed because seed "saved"from previous crops is more likely to harbor bacteria.

Chemical control:
- Copper sprays applied during early formation and expansion of fruit may result in substantially fewer symptomatic pumpkins.

Powdery Mildew

Powdery mildew can result in serious losses on squash, pumpkin, and muskmelon. Many cucumber varieties are resistant. Watermelons are rarely affected. The pathogen is believed to overwinter locally. It produces airborne spores that enable new infections to increase rapidly throughout an unprotected field.

Powdery mildew is one of the simplest diseases to diagnose. The white, powdery mold (see arrow) first appears on lower stems and petioles (Figure 8). As the disease continues to develop, the white moldy spots occur on the underside of leaves. Symptoms on the upper leaf surfaces (Figure 9) usually signal a severe outbreak (Figure 10). The pathogen does not infect pumpkin fruit, but may weaken pumpkin stems.

FIGURE 8

FIGURE 9

FIGURE 10

Disease Characteristics

Pathogen survival: . . . . . • Spores that survive locally among soil and crop residue.

Pathogen spread: . . . . . • Spores are wind-dispersed to neighboring plants and fields. They may be carried in wind currents for miles over large geographic areas.

Important environmental factor: . . . . . • Unlike many other infectious diseases, powdery mildew may become severe during extended periods of dry weather.

Disease Management

Disease resistance: . . . . . • Although several new varieties have measurable resistance to powdery mildew, most jack-o'-lantern pumpkins appear to be quite susceptible. "Big Max" types of pumpkins are less susceptible.

Cultural control: . . . . . • Normal rotations with noncucurbit crops will help prevent serious early season epidemics.

Chemical control: . . . . . • Several fungicides are effective against powdery mildew. Systemic fungicides can be effective if applied at appropriate times during the season, even if symptoms are not obvious. Timing is everything! In general, fields in the southern part of the state should receive an initial application by mid-to-late July. Fields in the northern part of the state should be treated before August 1. Check state vegetable disease management guidelines for current lists of registered fungicides.

Downy Mildew

Downy mildew is a disease often identified on pumpkin crops, but the extent of yield loss (if any) due to the disease in the Midwest is uncertain. The pathogen is a fungus that does not produce survival structures in northern states, and overwinters as live mildew colonies in Gulf Coast states. It progresses northward with cucurbit production each spring. Usually by the time downy mildew becomes established in the Midwest, pumpkins are already beginning to ripen in the field. Yield loss associated with downy mildew is most likely related to soft rots that occur after plant canopies collapse and sunburn occurs on fruit.

Downy mildew only affects leaves of cucurbit plants. Initial symptoms include large, angular or blocky, yellow areas visible on the upper surface (Figure 11). As lesions mature, they expand rapidly and turn brown. The under surface of infected leaves appears watersoaked. Upon closer inspection, a purple-brown mold (see arrow) becomes apparent (Figure 12). Small spores shaped like footballs can be observed among the mold with a 10x hand lens. In disease-favorable conditions (cool nights with long dew periods) downy mildew will spread rapidly, destroying leaf tissue without affecting stems or petioles.

FIGURE 11

FIGURE 12

Disease Characteristics

Pathogen survival: . . . . . • The downy mildew fungus does not survive the winter locally. Instead, it survives as active colonies in southern states.

Pathogen spread: . . . . . • Wind dispersal. The downy mildew pathogen follows cucurbit production northward from the Gulf Coast.

Important environmental factor: . . . . . • Downy mildew is favored by cool, wet conditions and therefore is usually a threat only late in the growing season.

Disease Management

Disease resistance: . . . . . • No available resistance in pumpkins.

Cultural options: . . . . . • Because the downy mildew pathogen does not overwinter in midwestern fields, crop rotations and tillage practices do not affect disease development. The pathogen tends to become established in late summer. Therefore, planting early season varieties may further reduce the already minor threat posed by downy mildew.

Chemical control: . . . . . • Fungicides applied specifically for downy mildew control may be unnecessary. Broad spectrum protectant fungicides such as chlorothalonil, mancozeb, and fixed copper are at least somewhat effective in protecting against downy mildew infection. Systemic fungicides are labeled for use against cucurbit downy mildew, but are recommended only after diagnosis of this disease has been confirmed.

Black Rot

Black rot is caused by a fungus that attacks pumpkins and other cucurbits. It causes the disease known as "gummy stem blight" on cucumbers and melons. Yield loss due to black rot occurs as a result of rapid defoliation of vines and fruit infection and subsequent decay.

Black rot affects leaves, stems, and fruit of pumpkins. Large, rapidly expanding, watersoaked lesions on the "face" of jack-o'-lanterns are characteristic of black rot infection (Figures 13 and 14). Stem infections result in irregular, tan lesions that have a corky texture and often exude an orange-red-brown gummy substance. The key diagnostic feature of black rot is the presence of small black fungal structures called pycnidia embedded in the diseased tissue. Pycnidia are smaller than a period printed on this page and often occur in groups or clusters within the lesion. A 10x hand lens should be used to view the pycnidia clearly.

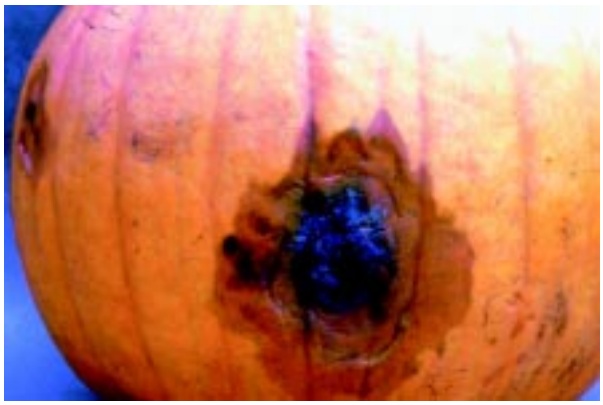

FIGURE 13

FIGURE 14

Disease Characteristics

Pathogen survival:
- Infested crop residue.
- Seed contamination.

Pathogen spread:
- Spores are splash-dispersed and wind-disseminated during periods of warm, wet weather.
- Long distance spread can occur with contaminated seed.

Important environmental factor:
- Warm, humid summers that are typical in the Midwest favor black rot development.

Disease Management

Disease resistance:
- None.

Cultural control:
- Implementing cultural control options alone will not result in satisfactory control of black rot. However, employing options such as rotating fields with nonsusceptible crops for at least 2 years, fall tillage of severely affected fields, and avoiding fields with a history of the disease may contribute to more effective and efficient chemical control by reducing disease pressure.

Chemical control:
- Apply protectant fungicides at 10- to 14-day intervals beginning when vines form a complete canopy within rows. Effective fungicides for use on pumpkins include chlorothalonil and mancozeb.

Microdochium Blight

Microdochium blight is a newly recognized fungal disease of pumpkins and squash. The disease was first reported in Tennessee in 1988, and has now been observed in several Southern and Mid-Atlantic states. It is an uncommon problem in Midwest pumpkin production, but has been found in southern Indiana.

All parts of the pumpkin plant may be affected. Spindle-shaped, tan to white lesions less than 1/4 inch in length develop on stems, leaf veins, petioles, and peduncles. Stem and petiole lesions can result in the death of attached leaves, and defoliation can occur in severe infections. Individual lesions on pumpkin fruit are quite small, but usually coalesce to form white to tan, roughened areas on the upper fruit surface (Figure 15). Fruit symptoms may resemble injury caused by a severe mite infestation.

FIGURE 15

Disease Characteristics

Pathogen survival: . . . . . • Infested crop residue in soil.

Pathogen spread: . . . . . • Spores presumably are splash-dispersed.

Important environmental factor: . . . . . • Warm, wet weather favors disease development.

Disease Management

Disease resistance: . . . . . • None reported.

Cultural control: . . . . . • Rotation with noncucurbit crops should help reduce disease pressure.

Chemical control: . . . . . • Fungicides registered for protection against black rot also are effective against Microdochium blight.

Fusarium Crown & Fruit Rots

Fusarium crown rot is caused by different Fusarium pathogens than those that cause Fusarium wilt diseases, even though wilting is part of the disease syndrome. Some crown rot fungi also are responsible for a characteristic fruit rot that occurs on pumpkins. The disease occurs to some extent every year in the Midwest; a few fields usually suffer much more severe outbreaks than others. Initial symptoms on pumpkins include a general yellowing of the entire plant; over the subsequent 2-4 weeks, the entire plant will wilt, collapse, and decay. Close inspection of stems of affected plants will reveal a watersoaked or necrotic area at or just below the soil line. Fruit symptoms vary dependent upon the specific Fusarium pathogen involved. Lesions may be small, dry, and pitted, or larger sunken areas covered with gray or white mold (Figure 16).

FIGURE 16

Disease Characteristics

Pathogen survival: . . . . . • Resilient spores that survive in soils for indefinite periods of time.

Pathogen spread: . . . . . • Mechanical spread with soil on farm implements from year to year.

Important environmental factor: . . . . . • Conditions responsible for outbreaks of these diseases are largely unknown.

Disease Management

Disease resistance: . . . . . • None reported.

Cultural control: . . . . . • Long rotations of noncucurbit crops will help to slowly reduce Fusarium populations in soil. Substantial losses will occur if fields with a history of the disease are planted in successive seasons. However, the disease can occur in fields with no history of disease or pumpkin production.

Chemical control: . . . . . • None.

Bacterial Wilt

Bacterial wilt is one of the most important diseases of melons and cucumbers. The bacterial pathogen responsible for this disease is spread from plant to plant by the feeding activities of striped and spotted cucumber beetles. While pumpkins are considered to be resistant to this disease, occasional outbreaks have been reported. We believe that the occurrence of bacterial wilt in pumpkins in the Midwest is rare. Wilting and collapse of vines in the field are most likely due to other disorders including Fusarium crown rot and squash vine borer.

Wilting of one or a few leaves is the first symptom of this disease. The pathogen colonizes the water-conducting tissue resulting in a restriction of water flow within the plant. In the early stages of the disease, plants with wilt symptoms may recover during the night, and wilt again in the heat of the day. After several days, the wilt becomes permanent, and the plant turns yellow and dies (Figure 17). Strands of bacterial ooze (Figure 18) may be visible in the lower stem of infected plants. This is most easily seen by cutting the stem into two pieces, pressing the cut surfaces together, then slowly drawing them apart. Threadlike strands of clear to white bacterial ooze will be visible between the cut stem surfaces.

FIGURE 17

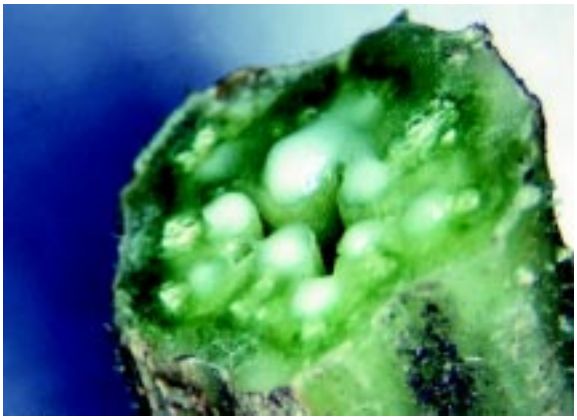

FIGURE 18

Disease Characteristics

Pathogen survival:	• Presumed to overwinter in the digestive system of adult cucumber beetles.
Pathogen spread:	• Spread by cucumber beetles when they feed on leaves and stems.
Important environmental factor:	• The rare instances when bacteria are transmitted to pumpkin vines most likely occur early in the season, when plants are relatively small.

Disease Management

Disease resistance:	• Most pumpkin varieties are considered resistant.
Cultural control:	• Avoid planting pumpkins next to muskmelons or cucumbers, which may increase disease pressure.
Chemical control:	• Insecticides aimed at reducing cucumber beetle populations may further reduce the incidence of bacterial wilt.

Virus Diseases

Virus diseases of pumpkins (and squash) may be caused by any of several different pathogens: cucumber mosaic virus (CMV), papaya ring spot virus - watermelon strain (PRSV-W), squash mosaic virus (SqMV), watermelon mosaic virus (WMV), and zucchini yellow mosaic virus (ZYMV). CMV and SqMV occur rarely, although the effects of SqMV can be especially severe because the virus can be seed-borne. ZYMV is identified occasionally and also can result in severe losses. Informal surveys during the past 15 years in Indiana indicate that WMV and PRSV-W are the most common virus diseases of pumpkins and squash.

Leaves of virus-infected plants often appear mottled and distorted (Figure 19). The extent of crop loss due to virus disease is highly correlated with the crop growth stage at which the virus becomes established in the field. Pumpkin plants infected early in their development (near or before the time of flowering) are severely affected and produce few fruit, and most of the pumpkins that are produced are likely to be misshapen or off-color (Figure 20). However, plants infected after fruit reach full size may not show any effect on yield or quality. Late-season pumpkins are especially prone to losses associated with virus diseases.

FIGURE 19

FIGURE 20

Disease Characteristics

Pathogen Survival:
- Viruses survive in infected weed hosts in fence rows, wooded acres, and non-cultivated fields.
- SqMV is seed-borne.

Pathogen spread:
- Insect vectors (especially aphids).
- Mechanical operations that disturb plants and bruise leaves and vines.

Important environmental factor:
- Aphids appear in fields during periods of hot, dry weather, but do not necessarily remain in fields. for days or weeks.

Disease Management

Disease resistance:
- None.

Cultural control:
- Early planted fields tend to have less damage than those that are planted later.
- Control weeds within and around fields.

Chemical control:
- Attempts to control insects for virus disease control may be futile, because insects may transmit the virus before insecticides are effective.

Notes

Printed on Recycled Paper

Rev. 5/99

http://www.agcom.purdue.edu/AgCom/Pubs/menu.html
1-888-EXT-INFO