College of Agriculture, Food and Environment
Cooperative Extension Service

Plant Pathology Fact Sheet **PPFS-GEN-19**

Botrytis Blight

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Importance

Botrytis blight, often referred to as gray mold, is a widespread and potentially destructive disease that can infect and spread quickly in a wide range of hosts (Table 1). It is a common disease in greenhouses, as environmental conditions in these structures are often ideal for infection. During periods of high humidity and/or rain, crops in commercial fields and residential plantings may also be at risk. In addition, Botrytis blight can result in decay of stored produce, and in the case of hemp, may damage floral material.

Symptoms & Signs

Botrytis blight may affect seedlings, buds, flowers, fruit, leaves, stems, and bulbs. Symptoms can vary depending on the host and plant tissue infected, but the presence of a distinctive gray to light-brown, fuzzy, moldy growth on diseased tissue is common to all (Figure 1). This moldy growth is comprised of fungal strands (mycelia) and clusters of spores (conidia).

Damping-off

Damping-off begins as water-soaked lesions that develop at or just below the soil line of stems of germinating seedlings. Lesions quickly girdle tender stems, and seedlings wilt, collapse, and die. Botrytis damping-off most frequently occurs in greenhouses, high tunnels, and cold frames, but may occasionally develop in fields.

Bud & Flower Blight

Bud and flower blight symptoms can include sudden death of buds before fully open, small off-color flecks or spots on petals (Figure 2), browning of petal edges, and complete blighting (rapid death) of entire flowers (Figure 3). Bud and flower infections can often be the initial source for infection of other tissues.

Fruit Rots

Fruit infections usually appear as soft, light brown areas on fruit surfaces (Figure 4), which spread rapidly throughout the fruit until it is completely destroyed. Rotted fruit can retain its general shape and become tough and dry; some fruit may shrivel and mummify. Fruit decay can occur on fruit in storage, as well as in plantings.

Small whitish round spots known as ghost spots may develop on some fruit, such as tomato. Ghost spots (Figure 5) result from infections that are halted when environmental conditions become less favorable for the pathogen.

Figure 1. The gray to tan moldy growth characteristic of Botrytis blight covering infected strawberry fruit.

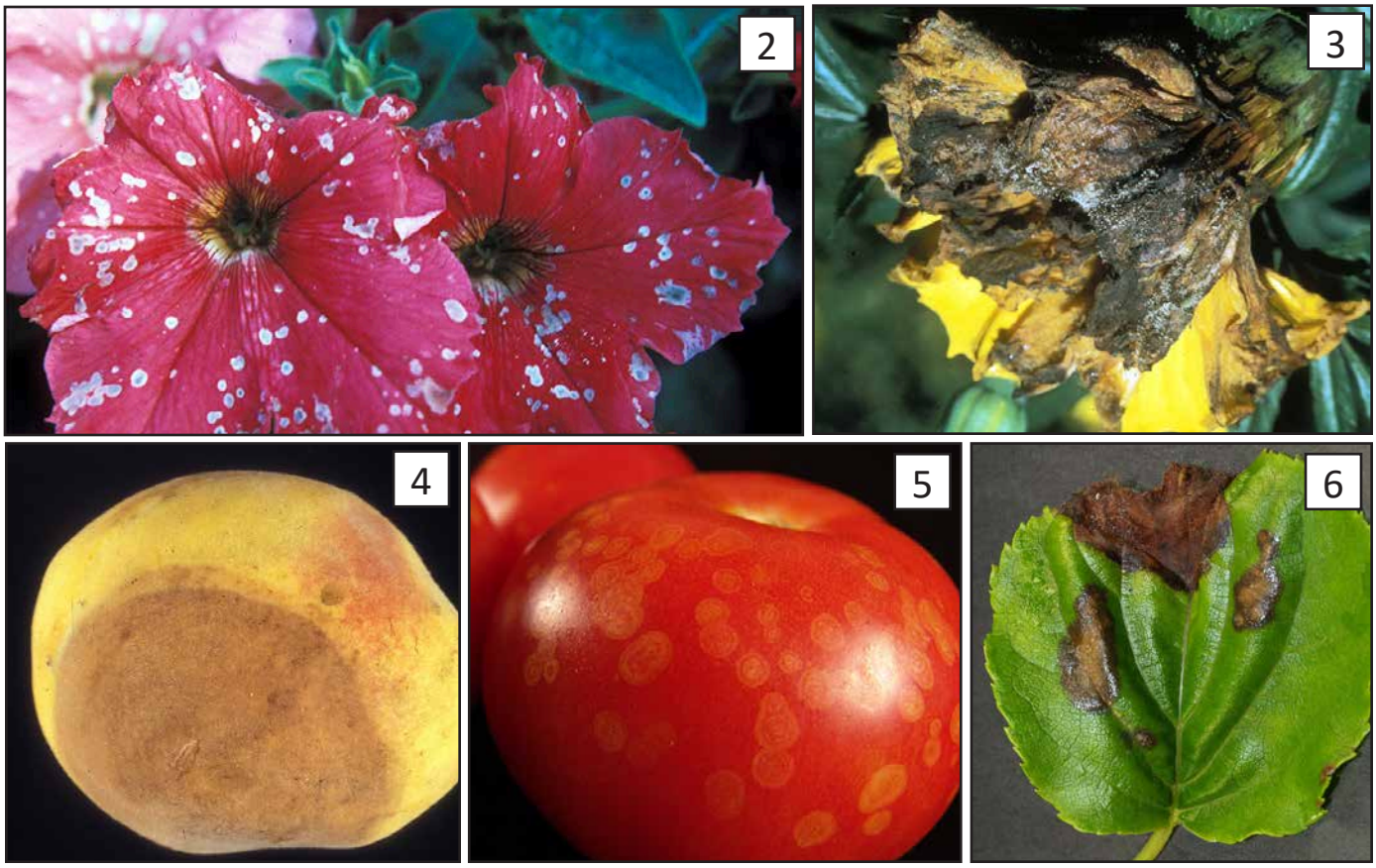

Figure 2. Off-color specks developing on *Botrytis*-infected petunia petals. **Figure 3.** Botrytis blossom blight causing rapid death of marigold flowers; note the fungal sporulation on diseased petals. **Figure 4.** Peach fruit with a soft, light brown decay from *Botrytis*; the entire fruit will eventually be destroyed. **Figure 5**. Ghost spots present on tomato fruit resulting from *Botrytis* infections that failed to progress due to unfavorable conditions for the fungus. **Figure 6.** Hydrangea leaf with leaf spotting and necrosis common with *Botrytis* foliar infections.

Leaf Spots/Blights

Leaf spots appear as large tan, gray, brown, or reddish-purple blotches on leaves (Figure 6). Spots may initially be water-soaked, but later become dry. Some spots may have a target-like appearance. As blotches expand and coalesce, entire leaves may die (blight). When young emerging leaves become infected, a tip blight may develop (Figure 7).

Stem Rots

Stem infections result in slightly sunken stem cankers on woody hosts and tan to brown decay of fleshy stems (Figure 8). Girdled or decaying stems result in death of plant parts above the canker or decay. In some instances, stems break at the point of infection.

Figure 7. Tip blight of hemp resulting from *Botrytis* infections that first developed in buds and emerging leaf tissues.

Figure 8. Peony stem rot due to *Botrytis* infections.
Figure 9. *Botrytis* resting structures (sclerotia) present at the neck of decaying onion bulb.

Bulb Rots

Bulb rots begin as water-soaked lesions at the bulb neck; infections move into the bulb causing internal decay. Black fungal resting structures (sclerotia) often develop around the bulb neck (Figure 9).

Cause & Disease Development

Numerous species of the *Botrytis* fungus have been linked to Botrytis blight disease. While some species, such as *Botrytis cinerea*, have a very wide host range, others are host-specific. Examples of some host-specific species include *B. allii* (onion neck rot), *B. squamosa* (onion leaf blight/blast), *B. tulipae* (tulip fire), *B. paeoniae* (gray mold of peony), and *B. gladiolorum* (gladiolus gray mold).

These fungi overwinter as thread-like mycelia in decaying plant debris and as hard, black survival structures (sclerotia) that are resistant to adverse conditions, such as drought, freeze, and even fungicides. *Botrytis* spp. can also overwinter in infected plant tissue.

Infection and colonization can take place under wet (rain or overhead irrigation) or humid (fog or dew) conditions. Optimal relative humidity (RH) for infections is 90%, but wounded tissue can become infected at 80% RH. Temperatures between 60°F and 75°F are optimal for infections and the production of large numbers of fungal spores (conidia); infections cease once temperature rise above 85°F. Fluctuating temperatures (warm, cloudy days and cool nights) that induce condensation to accumulate in greenhouses provide ideal conditions for Botrytis blight. Disease develops rapidly when plants are crowded, shaded, or in protected sites with poor air movement. Conidia are easily spread by air currents, rain, splashing water, and insects.

Botrytis spp. are opportunistic fungi that first become established in aging, damaged, or necrotic plant tissues before invading healthy tissues. Injured tissues from hail, wind, birds, other diseases, pruning wounds, and insects can be readily colonized by *Botrytis* fungi. When environmental conditions are no longer favorable, *Botrytis* may become dormant (latent) on plant surfaces until conditions are again conducive for infection and colonization.

Postharvest rot can occur on stored produce and reduce shelf-life. Fruit infected in the field can develop symptoms in storage. Diseased fruit can also contaminate nearby healthy fruit storage or during shipping.

Disease Management

Cultural practices that include proper sanitation and promote rapid drying of plant tissues are keys to reducing the incidence of Botrytis blight. Fungicides can also be used, but they are not effective unless these cultural practices are followed.

Cultural Practices

- Promote good air circulation:
  - Select planting sites with good air movement.
  - Provide adequate spacing between plants; thin plants as needed.
  - Ventilate greenhouses and high tunnels to increase air movement and to keep humidity levels below 80%. Open vents or use fans as needed.
- Avoid overhead irrigation.
- Avoid irrigating late in the evening to ensure leaves are completely dry.
- Avoid excess nitrogen applications, which promote the development of succulent tissues susceptible to infection.
- Remove dead, damaged, and senescing tissues (such as spent flowers) that can provide an initial food base for the *Botrytis* fungi.
- Remove and destroy diseased plant tissues and, if necessary, entire plants. Do not compost diseased material.
- Use proper pruning and pinching techniques; avoid tearing and excess wounding.
- Clean greenhouse surfaces (such as floors and woven weed mat) by sweeping. Wash benches, floors, and tools as needed and between crops. See sanitation and disinfection publications in Additional Resources.
- Harvest ripe fruit promptly and handle with care to prevent bruising.
- Store produce immediately after harvest at recommended temperatures and humidity. Hemp should be stored in a cool, dry location.

Fungicides

Disease management can be aided by applying contact or systemic fungicides to protect healthy tissues from infection. To reduce the possibility of resistance development, alternate between fungicides in different chemical groups (FRAC code). Before applying fungicides, remove diseased plant parts and thin plants as needed.

Synthetic fungicides may not be available for all crops (such as hemp); only apply fungicides registered for the target crop (refer to the product label). Follow all label instructions. For specific information regarding recommended fungicides, contact a local county Extension office or appropriate University of Kentucky disease management guide.

Additional Resources

Botrytis Diseases

- Botrytis Bunch Rot of Grape Disease Prediction Model
http://weather.uky.edu/cgi-bin/kyc_grape_bbr.pl
- Fruit Rots of Grape
https://plantpathology.ca.uky.edu/files/ppfs-fr-s-14.pdf

General Management

- Managing Diseases of Herbaceous Ornamentals (PPFS-OR-H-01)
https://plantpathology.ca.uky.edu/files/ppfs-or-h-01.pdf
- Managing Greenhouse & High Tunnel Environments to Reduce Plant Diseases (PPFS-GH-01)
https://plantpathology.ca.uky.edu/files/ppfs-gh-01.pdf

Fungicide Effectiveness

- Effectiveness of Grape Fungicides (PPFS-FR-S-18)
https://plantpathology.ca.uky.edu/files/ppfs-fr-s-18.pdf
- Effectiveness of Strawberry Fungicides (PPFS-FR-S-15)
https://plantpathology.ca.uky.edu/files/ppfs-fr-s-15.pdf

Sanitation

- Cleaning & Sanitizing Commercial Greenhouse Surfaces (PPFS-GH-07)
https://plantpathology.ca.uky.edu/files/ppfs-gh-07.pdf
- Cleaning & Disinfecting Home Garden Tools & Equipment (PPFS-GEN-17)
https://plantpathology.ca.uky.edu/files/ppfs-gen-17.pdf
- Fruit, Orchard, and Vineyard Sanitation (PPFS-GEN-05)
https://plantpathology.ca.uky.edu/files/ppfs-gen-05.pdf
- Greenhouse Sanitation (PPFS-GH-04)
https://plantpathology.ca.uky.edu/files/ppfs-gh-04.pdf
- Landscape Sanitation (PPFS-GEN-04)
https://plantpathology.ca.uky.edu/files/ppfs-gen-04.pdf

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Photos: University of Kentucky - Nicole Gauthier (1, 7); Bugwood.org - R.K. Jones, North Carolina State University (2), Malcom C. Shurtleff, University of Illinois (3), University of Georgia (4), Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org (5), Bruce Watt, University of Maine (6), Michell Grabowski, University of Minnesota Extension, Bugwood.org (8), and Sandra Jensen (9)

Table 1. Common hosts of *Botrytis* spp. in Kentucky.

Host	Common Disease Name	Plant Parts Affected
Agronomic		
Hemp	Gray mold	Growing tips, flower buds, petioles, stems, seedlings (damping-off)
Tobacco	Gray mold	In greenhouses: clipped leaves, stems
Fruit		
Blueberry	Botrytis blossom blight, Botrytis fruit rot, Twig blight	Flowers, fruit, twigs
Blackberry, Raspberry	Botrytis blight, Gray mold, Botrytis fruit rot	Flowers, fruit, leaves, canes
Grape	Botrytis bunch rot, Gray mold	Flowers, fruit
Strawberry	Botrytis blight, Ash mold, Botrytis fruit rot	Flowers, fruit
Ornamentals		
Annual herbaceous flowering plants*	Botrytis blight	Buds, flowers, leaves, stems, seedlings (damping-off)
Gladiolus	Botrytis blight, Botrytis leaf & flower spot, Corm rot	Flowers, leaves, stems, corms
Hibiscus	Botrytis blight	Flowers, leaves
Hydrangea	Botrytis blight, Gray mold	Buds, flowers, leaves
Indoor plants	Botrytis blight, Gray mold	Leaves, flowers
Peony	Botrytis blight	Buds, flowers, leaves, stems
Poinsettia	Botrytis blight, Botrytis stem canker	Bracts, leaves, stems
Rose	Botrytis blight, Botrytis bud & twig blight, Gray mold	Buds, flowers, leaves
Tulip	Fire, Gray mold	Flowers, leaves, stems, outer scales of bulbs
Vegetables		
Cabbage	Botrytis blight	Leaves, crowns
Lettuce	Botrytis crown rot, Gray mold	Seedlings (Damping-off), leaves, crowns
Onion	Neck rot	Bulbs, particularly in storage
Onion	Leaf blight, Blast, Botrytis leaf spot	Leaves
Pepper	Botrytis blight	Flowers, fruit, senescing leaves, petioles, stems
Tomato	Botrytis blight	Seedling stems, flowers, fruit
Tomato	Ghost spot	Fruit
Herbs		
Basil, Thyme	Gray mold	Flowers, leaves, stems (wounded)
Rosemary	Botrytis stem canker	Leaves, stems
Stevia	Botrytis blight	Buds, leaves, stems, flowers, crowns

* Common Kentucky hosts: Begonia, Calibrachoa, Catharanthus, Chrysanthemum, Geranium, Impatiens, Marigold, New Guinea Impatiens, Pansy, Petunia, Snapdragon, Sunflower, Zinnia