Botrytis Leaf Blight and Purple Blotch of Onions in Florida

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Onions are grown throughout Florida in small-to medium-sized commercial plantings or in home gardens. Numerous plant diseases occur in the roots, bulbs, and leaves of onion. Purple blotch and botrytis leaf blight are the most commonly occurring leaf diseases of onions in Florida. Downy mildew, a disease that occurs commonly in some states, has been rarely found in Florida.

BOTRYTIS LEAF BLIGHT

Botrytis leaf blight (BLB), sometimes called blast, is caused by the fungus *Botrytis squamosa*. While other species of Botrytis have been associated with diseases of the leaves and bulbs of onions, *B. Squamosa* is generally regarded as the usual cause of leaf spots in onion foliage and sometimes in the outer scales of the bulb.

Botrytis neck rot, typically a postharvest disease, is likely to be caused by *B. allii* or *B. cinerea*. *B. cinerea*, a common pathogen of many other crops, also may produce leaf symptoms that are similar to those caused by *B. squamosa* but such infections are more superficial and generally regarded as rare.

The generic name *Botrytis* refers to the portion of the cycle of *Botrytis* spp. during which the spores (conidia) are produced asexually. In addition, *Botrytis* spp. are capable of producing sexually derived spores (ascospores) in the portion of the life cycle called *Botryotinia*.

The sources of spores that cause BLB in onions grown in Florida have not been determined. However, nearby onion plantings, volunteers, and old onion debris in fields or cull piles are probable sources of inocula. Asexually produced conidia are likely to be the principal type of inoculum. Conidia, dispersed mainly by wind, are produced abundantly during cool, wet conditions on blighted leaves, onion debris, or sclerotia of the fungus.

Sclerotia are embedded in bulb or leaf tissues on onions or may exist in soil after the onion tissue has completely decomposed. They provide, a mechanism for long-term survival of this fungus. Sclerotia are somewhat elongated structures of compacted masses of fungal hyphae with a black outer rind and a white to grey interior that may be as large as several millimeters. In addition to the ability to produce conidia, sclerotia can produce sexually derived spores called ascospores. Ascospores are produced in microscopic sacs within mushroom-like structures (apothecia) that grow on the outside of sclerotia. Ascospores can serve as inoculum for disease, and they are important as sources of new genetic variants for this fungus.

Botrytis leaf blight has been seen most commonly south of Gainesville in Florida. It is

regarded as a cool, wet-weather disease. Some infection can occur with only seven hours of leaf wetness if temperatures are near the optimum range of 59° to 68°F. As temperatures deviate from this optimum range, longer periods of leaf wetness are required for infection. For example, temperatures at 48°F and 79°F are conducive to infection, provided that leaf wetness periods increase to 10 hours. Levels of infection should be regarded as being most severe if leaf wetness periods approach 14 hours, provided that temperatures are in the optimum range. Severe levels of infection can also occur at 48°F and 79°F if leaf wetness periods last for nearly 20 hours.

Symptoms of BLB include whitish flecks in onion leaves (Figure 1). *Botrytis cinerea* can cause similar, but more superficial symptoms. This latter fungus, common in Florida, causes diseases in many broadleaf plants but is not known to cause disease in onions in Florida. Herbicides, thrips, and ozone can induce symptoms that appear somewhat similar to those of BLB in onions. However, lesions of BLB often begin as distinct watersoaked areas that persist around mature lesions. With increasing severity of BLB, onion fields appear progressively more yellow in color.

Older (outer) leaves tend to be more susceptible to BLB than younger leaves. Conidial production is greatest on blighted and dead leaves. Small lesions in green leaves may not produce conidia. Because larger, more numerous lesions occur on older leaves, BLB appears more as a blight than as distinct spots on older leaves, particularly near the leaf tips.

Control of BLB includes crop rotation with crops not related to onions (leeks, garlic, chives, and amaryllis are in the same plant family). Destroying old onion debris in fields by burying it with moldboard plows will reduce inocula. Cull piles in fields and loading areas near packing houses should be destroyed. Disease-free transplants should be used. A sequence of fungicide spray treatments may be necessary to reduce BLB and improve the yield and quality of the onions. Fungicide spray programs are most effective when initiated before the disease becomes too severe. If temperatures and leaf wetness are suitable for BLB, spraying should be initiated when no more than one lesion of BLB per leaf has appeared. Spray intervals of five to seven days may be required during weather favorable for disease. Thoroughly covering onion leaves with the spray is essential for a high level of control.

PURPLE BLOTCH

Purple blotch (PB) is caused by the fungus *Alternaria porri*. Bulbing onions, green onions, and leeks have been infected frequently in Florida, but other onion types also are susceptible. As disease severity increases, leaf size, bulb size, and bulb weight decrease drastically. Purple blotch occurs throughout the state and yield losses due to PB have been measured at more than 50 percent in Florida.

Symptoms induced by the fungus causing PB are of two types. Initially, flecks similar to those induced by the BLB fungus may occur in leaves. Later oval to football-shaped lesions appear, sometimes accompanied by linear yellow to brown streaks that progress from the main lesion (Figures 2 and 3). Individual lesions may be two or more inches long. Individual lesions may be light brown throughout or have a dark brown to purple central area surrounded by a light brown area. Lesions may contain alternating, concentric zones of dark and lighter tissue. The concentration of asexually produced spores (conidia) is greatest in the darker portions of the lesions. With increasing severity of PB, leaves become generally yellow to brown and lose erectness.

Conidial inoculum for initiating an epidemic can originate in nearby plantings, volunteers, old, infected onion debris, and possibly other debris in the field.

These spores are dispersed primarily by wind. Upon landing on a leaf, a spore germinates, and then penetrates the leaf when the next leaf wetness period occurs. From such infections, new lesions may form in seven days or less.

Temperatures below 55°F are not conducive for infection by the fungus causing PB, but temperatures above 55°F contribute to the development of this disease. Because the PB fungus is active across a wide range of temperatures above 55°F, increasing leaf wetness and relative humidities above 90 percent generate higher probabilities for infection and disease occurrence. Leaf wetness periods of nine to eleven hours are adequate to promote spore production and infection. As periods of leaf wetness become longer, conditions for development of PB are improved.

Onion leaves become more susceptible to PB as they age. Emerging leaves become increasingly more susceptible to PB as the bulbs approach maturity.

Control of PB includes rotating crops with nonsusceptible crops, accelerating decomposition of old onion debris in the field, destroying volunteers, and using healthy transplants. Spraying with labeled fungicides is often necessary. A sequence of spray treatments, delivered at five-to-seven day intervals, should be initiated when symptoms of PB first appear if leaf wetness periods exceed 11 hours. Spray intervals can be lengthened during extended dry periods, when leaf wetness lasts for less than nine hours. Thoroughly covering onion leaves with the spray is essential to achieve control. With proper use of nozzle arrangements and spreader-sticker adjuvants, excellent control of PB and BLB can be achieved.

Figure 1. Lesions caused by Botrytis in onion leaves.

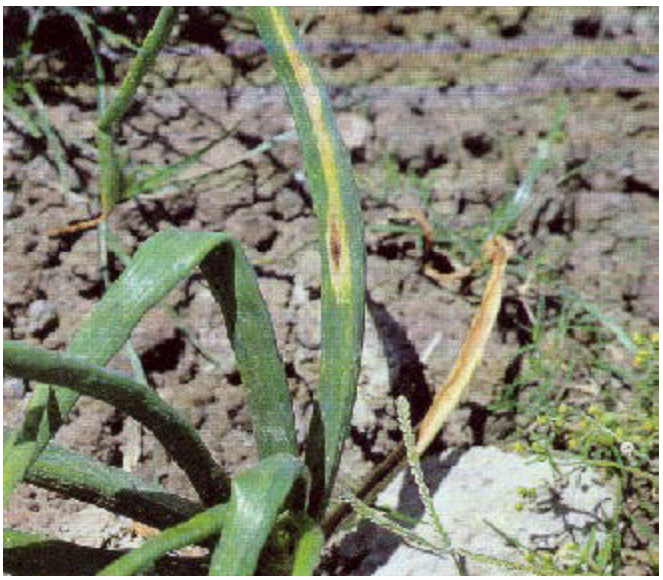

Figure 2. Purple blotch in onion.

Figure 3. Purple blotch in leek.