Disease Cycle

The pepper spot fungus survives between peanut crops on infested crop residue in the soil. Spores of the fungus are released into the air during the end of dew periods and the beginning of rainy periods. Conditions favoring leaf infection are not well defined.

Control

Cultural practices, such as residue management and crop rotation that are recommended for leaf spot control, should also be effective in reducing pepper spot. Spanish varieties are most susceptible to pepper spot. Fungicide programs for leaf spot have not been very effective against pepper spot.

Symptoms

The fungal pathogens attack any above-ground portion of the plant, but leaf spots are the most conspicuous symptom. Depending upon weather conditions and cropping history, leaf symptoms usually appear between 30 to 50 days after planting. Symptoms of both early and late leaf spot first appear as brown or black, pinpoint-size dots on the upper leaf surface. Early leaf spot lesions enlarge to become brown to dark brown, circular spots with a distinct yellow border or halo (Figure 1). Late leaf spots typically appear as black, circular spots lacking or with a less pronounced yellow halo (Figure 2). Both early and late leaf spots reach a size of about one-fourth of an inch in diameter. The presence or intensity of a yellow halo on the upper leaf surface is not always a reliable characteristic for identifying early and late leaf spots. Unlike leaf spots caused by pesticide injury, both early and late leaf spots are clearly defined on the lower leaf surface. Early leaf spots are usually brown (Figure 3), while late leaf spots are dark brown to black (Figure 4) on the lower leaf surface. The color of the spots is also a variable characteristic, depending on the variety and the age of the spots, and is generally only useful when leaves are affected by both diseases. The most reliable method of distinguishing between the two leaf spot diseases is to closely examine spots for development of reproductive structures (sporulation). When spots are actively sporulating, the grey-colored tufts of mold are visible with a 10X hand lens on the upper leaf surface for early leaf spot and on the lower leaf surface for late leaf spot.
spores are produced in mature spots shortly thereafter. The spots develop about 10 to 14 days after infection, and new are produced on infested peanut residue in the soil. Visible spores on infected plant parts. Spore production is favored to reproduce and infect plants by means of microscopic spores.

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defoliation is severe, lesions appear on stems, petioles and the leaf that cause leaf drop. Defoliation usually occurs first with either leaf spot fungus produces hormonal changes in turn pale green to yellow, wither and fall off the plant. Infection to form large, irregularly shaped dead areas. Affected leaves lower leaf surface for late leaf spot (Figure 4). When leaf spot typically black in color and may be rough in texture when Figure 4. Late leaf spots on the lower leaf surface are black in color and may be rough in texture when spores are being produced. Note the abundant moldy tufts of sporulation (Photo courtesy of Austin Hagen, Auburn University)

lower leaf surface for late leaf spot (Figure 4). When leaf spot lesions enlarge and become numerous they often coalesce to form large, irregularly shaped dead areas. Affected leaves turn pale green to yellow, wither and fall off of the plant. Infection with either leaf spot fungus produces hormonal changes in the leaf that cause leaf drop. Defoliation usually occurs first on lower leaves, then progresses upward (Figure 5). When defoliation is severe, lesions appear on stems, petioles and pegs as dark brown to black, oval-shaped blotches.

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The fungal pathogens that cause early and late leaf spots reproduce and infect plants by means of microscopic spores. Both fungi are capable of producing tremendous numbers of spores on infected plant parts. Spore production is favored by high humidity. The source of the spores that cause the earliest infections of the growing season (primary inoculum) are produced on infested peanut residue in the soil. Visible spots develop about 10 to 14 days after infection, and new spores are produced in mature spots shortly thereafter. The new spores produced in spots on infected leaves (secondary inoculum) serve to infect new leaves. Spores are spread by wind, splashing rain and insects. Leaf spot can increase rapidly under favorable conditions, as several secondary cycles may occur per season. Abundant peanut residue in fields where peanuts are cropped continuously often result in early and rapid development of leaf spot.

The first appearance of leaf spot and its continuous progress throughout the growing season are heavily dependent upon weather conditions. Conditions required for both types of leaf spot are warm temperatures and long periods of high humidity or leaf wetness. Wet periods of sufficient duration to support infection, usually consist of frequent nightly dew periods or rainy periods. When adequate moisture is present, temperature controls the rate of disease development. In Oklahoma, moisture most often limits leaf spot development in the summer, while cool temperatures (below 60 F) slow disease development in the fall. Frequent irrigations with small amounts of water also promote disease development by increasing the periods of high humidity and leaf wetness.

Control

Control of leaf spot is essential to prevent heavy defoliation and yield loss. An integrated management program that uses cultural practices, genetic resistance and a fungicide program is suggested. Cultural practices will give partial control of leaf spot. Rotation of peanuts with other crops and management of peanut residue by tillage, help delay the onset of disease and slow leaf spot development. These practices reduce the level of primary inoculum in the field. Peanut varieties differ in reaction to leaf spot, but levels of resistance in peanut varieties alone are not sufficient to provide adequate disease control. Spanish varieties are more susceptible, Virginia types are intermediate and runner varieties are partially resistant. Proper irrigation will also help reduce leaf spot. Application of an adequate amount of water, rather than frequent irrigation with small amounts, will help maintain a drier canopy and soil surface between irrigations.

In addition to cultural controls, a fungicide program is normally required to prevent yield loss from leaf spot. Several fungicides are available that provide excellent leaf spot control when applied on a recommended schedule. Some fungicides that control foliar diseases also control sclerotinae diseases such as southern blight, limb rot and Sclerotinia blight. Because fungicides act to protect healthy leaves and plants from infection, they must be applied preventively. The goal of the spray program should be to minimize defoliation at harvest. Recommended application schedules include a 14-day schedule and programs that base applications on weather conditions (MESONET Early Leaf Spot Advisory and AuPnuts programs). The number of applications and cost of fungicide programs vary depending upon the variety, cultural practices and application schedule used, the need for control, disease control and the level of control desired. Some fungicides are prone to resistance problems when they are used exclusively over a period of time. Fungicides with different modes of action can be applied in alternation, in a tank mix, or in a pre-mix to deter the development and build-up of resistance. Consult the Peanut Production Guide for Oklahoma (Circular E-806) and your county extension agent for current recommendations regarding recommended fungicides, applications schedules and resistance management strategies.