

# Foliar Diseases of Peanuts

## Early and Late Leaf Spot

Early and late leaf spot are the most destructive diseases of peanut in Alabama. For decades, peanut harvesting in Alabama started when all the peanuts in a field were stripped of their leaves by one or both of these diseases. Improved disease control in the early 1970s, which came with the availability of much more effective leaf spot fungicides, resulted in sizable gains in pod yield and quality. Depending on weather conditions, annual losses to early and late leaf spot still range between 5 and 10 percent of Alabama's total peanut crop. In isolated fields, failure to control one or both of these diseases can reduce expected pod yields by 20 to 30 percent.

Early leaf spot, caused by *Cercospora arachidicola*, is the most common of the two leaf spot diseases on peanut. From 1979 through the 1990 growing season, late leaf spot, caused by *Cercosporidium personatum*, was the predominant leaf spot disease on Alabama's peanut crop. Prevailing weather patterns, variety selection, and other management inputs influence the year-to-year occurrence of both leaf spot diseases.

## Symptoms

Symptoms of both diseases first appear on the leaves as small yellow to brown flecks. Early leaf spot is characterized by circular spots that are brown to reddish brown on the upper surface and almost orange on the lower surface. The lesions always have a bright yellow halo and are about the diameter of a No. 2 pencil (Figure 1). Late leaf spot lesions,

which range in color from dark brown to almost black and have a feathery margin, are usually similar in size and shape to those of early leaf spot (Figure 2). A pale yellow halo is rarely associated with lesions of late leaf spot and is only seen in June and early July. Some years, spots of early and late leaf spot may be seen on the same leaflets. On peanuts severely damaged by early or late leaf spot, spots similar in color but larger than those found on the leaves are commonly seen on the leaf petiole and the central and lateral stems. Due to similarities in spot color on some peanut cultivars, early and late leaf spot may be difficult to distinguish.

Early leaf spot lesions often appear smooth on both leaf surfaces because the causal fungus produces

relatively few spores. During periods of heavy cloud cover and frequent showers, masses of clear to olive-colored spores may be seen with the use of a hand lens on the upper surface of a spot (Figure 3). Because the late leaf spot fungus produces many spores on the upper and especially lower leaf surfaces, the lesions usually have a raised or tufted appearance. Badly spotted leaves often fall to the ground well before harvest (Figure 4). Leaf shed usually starts at the base of the central or lateral stem and continues upward until all but the



Figure 1. Early leaf spot on peanut



Figure 2. Late leaf spot on peanut



Figure 3. Olive-colored spore masses of the early leaf spot fungus on the face of the leaf spot



Figure 4. Premature leaf shed, caused here by early leaf spot, may result in substantial losses in peanut yield and grade.

youngest leaves at the shoot tips are lost. In severely leaf-spot-damaged fields, a thick carpet of fallen leaves often litters the ground around the base of the bare-stemmed peanut plants. Badly defoliated peanuts often shed numerous pods as the weakened pegs break when the plants are dug and inverted. The earlier defoliation begins, the greater the yield loss. To avoid such heavy yield losses, leaf-spot-defoliated peanuts usually must be dug well before their expected maturity date.

As their names imply, early leaf spot is usually seen in Alabama peanut fields well before late leaf spot has made its appearance. In the last few years, early leaf spot has been found as early as mid- to late May on the leaves of peanuts planted in late April. When late leaf spot was the predominant leaf spot disease on peanut, spotting of the leaves first occurred in late June to early July. Recently, this disease really has not been observed on peanut until mid- to late August.

Leaf spot diseases can easily be mistaken for injury caused by soil- and foliar-applied pesticides. Pesticide injury is usually seen on the new growth, while leaf spot disease symptoms are more prevalent on the mature leaves.

The injury from soil-applied pesticides, especially insecticides, appears as early leaf-spot-like lesions scattered along the margins of leaves of peanut seedlings. Typically, injury from foliar-applied pesticides appears within a day or two of the application; the randomly scattered brown to reddish brown spots are concentrated in the upper canopy of the plants. Often, white areas of pesticide residue are seen in the centers of these spots.

The causal fungi of both diseases overseason between peanut crops in undecomposed leaf and stem debris. Spores of both fungi are spread to peanut foliage by splashing water and wind. Frequent showers and prolonged periods of leaf wetness caused by heavy dew or fog favor infection

of peanut foliage by both pathogens. Spots will appear in as few as 6 and up to 17 days after infection. Weather patterns favoring infection of the foliage also are conducive to spore production by both leaf spot fungi. Due largely to the higher reproductive rate of *C. personatum*, late leaf spot usually spreads more rapidly than early leaf spot does.

## Control

Regardless of past cropping history, early leaf spot and late leaf spot are a significant threat to every field of peanuts in Alabama. The strategies for managing peanut leaf spot diseases involve the adoption of production practices that delay disease onset by reducing the carryover of the causal fungi in the field and that slow disease spread to the point that crop yield and quality are unaffected.

Crop rotation can be a useful tool in delaying initial infections by both leaf spot fungi; this delay slows further disease spread for the rest of the growing season. Rotations where peanuts are grown once every 3 to 4 years are long enough to permit leaf and stem debris from the previous peanut crop to decompose, thereby minimizing the carryover of both leaf spot fungi. Also, deep turning debris from the previous peanut crop is strongly recommended before rotating a field back to peanut. Although some research results suggest that levels of early leaf spot may be lower in no-till than in conventionally tilled peanuts, cropping patterns will have more influence on disease levels than tillage practices will. Eliminating volunteer peanuts in the field or forage crops that follow peanuts and in the fall immediately after peanut harvest is a critical component of a successful rotation program. In leaf spot-prone fields, planting in late April may also help slow disease spread.

Selecting peanut cultivars with partial resistance to one or both leaf spot diseases is an effective disease management tactic. Although cultivars with partial resistance still need some fungicide protection, total

fungicide inputs required to maintain optimum yield should be greatly reduced. Southern Runner and Florida MDR98 both have partial resistance to late and early leaf spot. Where late leaf spot is the predominant leaf spot disease, from three to four fungicide applications applied every 21 days should provide effective control of this disease on both cultivars. Although the Southern Runner peanut has partial resistance to white mold and tomato spotted wilt as well as late leaf spot, this cultivar is highly susceptible to the peanut root-knot nematode and should not be grown in fields where damaging populations of this nematode are found.

Fungicides are needed to control early and late leaf spot and produce optimum peanut yields. Recommended fungicides are listed in IPM-360, "Peanut Insect, Disease, and Weed Control Recommendations," and Extension publication ANR-500, *Alabama Pest Management Handbook*. Fungicide applications can be scheduled according to the calendar or to a weather-based spray advisory such as AU-PNUT. The current calendar spray program calls for fungicide applications to begin approximately 30 to 40 days after planting or no later than June 1 on peanuts planted May 1. To delay the onset of early leaf spot, a chlorothalonil fungicide can be tank-mixed with cracking time or early postemergence herbicides. Effective season-long control of both leaf spot diseases can be maintained by applying a recommended fungicide every 10 to 14 days up to 2 weeks before the expected digging date. Generally, shortening the spray schedule from about 14 to 10 days is usually necessary only in fields frequently cropped to peanut or during periods of frequent rain showers. On badly leaf-spot-damaged peanuts, further shortening of the spray schedule to as few as 7 days between applications may be required to prevent sizable yield loss.

Weather patterns do not always favor the development of leaf spot diseases on peanut. Extended periods of hot, dry weather, a common feature of Alabama summers, will slow the development of either early or late leaf spot in nonirrigated peanuts. As a result, leaf spot fungicides applied during such long dry spells may be wasted. Weather-based spray advisories such as AU-PNUT will provide disease control similar to that obtained on a 14-day calendar spray program but with generally fewer fungicide applications and at less cost to the producer. Under the AU-PNUT advisory, the decision about whether or not to apply a fungicide is based on the number of showers and the 5-day rainfall forecast. AU-PNUT requires the producer to routinely check and record daily rainfall totals for each field. To ensure application timeliness under this and any other weather-based spray advisory, fungicides should be applied by air. AU-PNUT Rules are listed in IPM-360, "Peanut Insect, Disease, and Weed Control Recommendations."

Regardless of the method used to schedule fungicide applications, fields should be checked every 1 to 2 weeks starting in early July to determine the progress of leaf spot epidemics. The procedures for scouting peanuts for leaf spot diseases are described in Extension publication ANR-598, "Peanut Pest Management Scout Manual." If spotting of the leaves in the lower canopy is seen, one or more of the following adjustments must be made to prevent sizable yield loss.

1. Stay on a calendar spray program, and shorten the interval between fungicide applications to 7 to 10 days.

2. Make several applications of a tank mix containing a full rate of a triazole and chlorothalonil fungicide.

3. Replace worn nozzles, and recalibrate spray equipment with the boom set at the proper height to ensure spray penetration through the peanut canopy.

4. In fields sprayed by air, make sure there is some overlap between spray swaths.

Good coverage of peanut foliage is critical for effective control of leaf spot diseases with fungicides, especially chlorothalonil. Calibrate ground spray equipment to deliver a minimum of 10 to preferably 15 gallons of spray volume per acre at 60 to 80 psi through three solid or hollow cone nozzles per row. To minimize spray drift or droplet evaporation, set the boom at the proper height above the peanut canopy. A properly set up and operated aircraft can consistently provide the coverage with all recommended fungicides needed to control leaf spot diseases. Spray volume should range between 3 and 5 gallons per acre. Due to reduced vine damage and soil compaction, some yield gains may occur in aircraft-sprayed fields over those where ground equipment is used. See Extension publication ANR-255, "Aerial Pesticide Application—The Farmer's View," for additional information concerning the aerial application of pesticides. Although fungicides may be applied to peanut through the line with a center pivot or side roll irrigation system, the level of disease control is not comparable to that normally obtained with ground equipment and aircraft.

Resistance management has become a major concern following the registration of the triazole fungicides propiconazole (Tilt) and tebuconazole (Folicur) on peanut. Tilt is recommended primarily for the control of early leaf spot, while Folicur will control early and late leaf spot, peanut rust, white mold, and limb rot. Both of these fungicides are systemic in peanut and have a single-site mode of action. Control failures due to insensitivity or resistance are much more likely for fungicides that act at single rather than at multiple action sites, such as chlorothalonil (Bravo, Echo, Terranil).

A resistance-related failure of triazole fungicides to control leaf spot diseases is unlikely to occur. However, repeated applications of triazole fungicides could cause a slow erosion of disease control due to a gradual loss of sensitivity in the target pathogen population. Of the common fungal pathogens of peanut, the early and late leaf spot fungi are most likely to become insensitive or resistant to triazole fungicides.

Peanut growers cannot entirely rely on triazole fungicides to control foliar and soilborne diseases of peanut. Limiting the number of triazole fungicide applications to a block of four sprays or the addition of a contact fungicide tank-mix partner, such as chlorothalonil, will greatly reduce the risk of a control failure without compromising fungicide efficacy.

Currently, triazole fungicides should total no more than half (four total sprays) of all fungicide applications made yearly to peanut. If additional applications (five or more) of a triazole fungicide are planned, a chlorothalonil fungicide must be tank-mixed with **all** triazole fungicides applied during that growing season. Also, peanut producers are strongly advised to start and finish their fungicide spray program by applying chlorothalonil alone or as a tank-mix partner with a triazole fungicide.

## Peanut Rust

Peanut rust, caused by *Puccinia arachidis*, occurs sporadically on peanut in Alabama. Widespread use of chlorothalonil fungicides has kept problems with peanut rust to a minimum. Left uncontrolled, peanut rust can be equally as destructive as leaf spot diseases can. Outbreaks of this disease are most likely to be seen beginning in late July to early August in Covington, Geneva, and Houston counties. Recently, severe rust-related plant death and yield loss was observed on Virginia-type peanuts in Baldwin County.

## Symptoms

Peanut rust is easily identified by the appearance of numerous tiny, reddish orange pustules on the undersides of the leaflets (Figure 5). The ruptured pustules contain masses of powdery, orange spores. Although the badly diseased leaflets quickly turn light brown and die, they often remain attached to the plant. When left unchecked, diseased peanut plants take on a scorched appearance, quickly die, and shed most mature pods. Because they mature 2 to 3 weeks early, any remaining pods harvested have low test weights.

Peanut rust first appears on one to several plants in scattered focal points or "hot spots" across a field of peanuts (Figure 6). These hot spots of peanut rust are easily mistaken for spider mite damage. Under favorable weather conditions, failure to start an intensive fungicide spray program



**Figure 5.** The orange rust pustules are clearly visible on the undersides of the leaflets.



**Figure 6.** A rust hot spot in peanut

allows disease spread to continue until the field is destroyed. Epidemics of peanut rust develop faster than those of early or late leaf spot do. Spores of the peanut rust fungus are short-lived and do not survive from year to year on peanut crop debris. Rather, this fungus is moved into Alabama from Central America by subtropical weather systems, especially tropical storms or hurricanes. Extended periods of cloudy, wet weather during July and August tend to favor the appearance of rust on peanut.

## Control

Most of the management practices useful in slowing the spread of leaf spot diseases in peanut are ineffective against rust. Since rust does not appear until late summer, disease outbreaks may be avoided by plant-

ing a short-season peanut cultivar in late April. Late peanuts should not be sown near fields planted earlier in the season. The cultivar Southern Runner, which has some resistance to peanut rust, is a good selection in rust-prone areas. This cultivar, however, is highly sensitive to attack by the peanut root-knot nematode and should not be planted where damaging populations of this nematode are present. Most other runner-type peanut cultivars reportedly are susceptible to peanut rust. Fungicides applied according to a recommended calendar or weather-based spray schedule such as AU-PNUT generally will control rust on peanut. The fungicides chlorothalonil, azoxystrobin, and tebuconazole have excellent activity against the peanut rust fungus (but propiconazole is ineffective).

Beginning in late July, fields in rust-prone areas should be checked weekly for peanut rust hot spots. Particular attention should be paid to areas of peanuts with off-color or yellow foliage. If rust is found, the full rate of a recommended fungicide should be applied every 7 days until 2 weeks before harvest. Recommended fungicides are listed in IPM-360, "Peanut Insect, Disease, and Weed Control Recommendations," and in Extension publication ANR-500, *Alabama Pest Management Handbook*.

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Use pesticides **only** according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

The pesticide rates in this publication are recommended **only** if they are registered with the Environmental Protection Agency and the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

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