Peanut Diseases Atlas

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Correct identification of peanut diseases is the first step in planning a control program. Fortunately, plant symptoms can be used to identify most diseases. For example, the fungi that cause leaf spot produce characteristic dark brown spots which are distinctly different from those produced by other organisms. This publication was developed to help growers identify peanut diseases by observing symptoms.

Variations in disease symptoms occur under different growing conditions and on different peanut varieties. But the variations usually will not cause a wrong diagnosis if the observer takes into account differences in symptoms within the field. If signs or symptoms of the disease differ considerably from what is considered to be normal, a plant sample should be submitted for study and microscopic examination. New diseases do occur and minor diseases sometimes become more common.

Special attention should be given to diseases that occur consistently and cause heavy losses, since growers will benefit economically from their control. Correct disease identification is essential to the selection of effective cultural or chemical control practices.

Foliage Diseases

Leaves manufacture the food components of all plant structures, such as leaves, stems, roots, pods and kernels. The process by which a leaf converts light energy to organic compounds is called photosynthesis. For maximum production, a plant must have healthy foliage throughout the growing season.

Disease organisms infecting peanut plants produce toxins that cause adverse effects. For example, the fungus that causes early leaf spot produces a toxin that initiates leaf shed. Fallen leaves enhance the development of another disease, southern blight.

1. **Early leaf spot** (fungus—*Cercospora arachidicola*)

Brown to black circular spots occur on leaflets, petioles or stems. Spots on leaflets first appear as faint brown to black pinpoint dots, but enlarge with age. As spots become numerous and run together their shape becomes irregular. Dead center areas often are surrounded by halos of yellow tissue, but using this characteristic as a means of distinguishing early leaf spot from late leaf spot is not always reliable.

Spore production may give the leaf surface a slightly raised, sooty appearance when observed at close range or under magnification. Spores can be produced on either leaf surface, but most are produced on the upper surface.

Spots on petioles and stems are similar to those on leaves except that they tend to be more irregular in shape with less distinct outlines. Infection of petioles and stems is more common when leaves also are heavily infected. When these tissues are damaged, the flow of water, nutrients and food is impaired.

2. **Late leaf spot** (fungus—*Cercosporidium personatum*)

The fungus causing this disease is closely related to the one causing early leaf spot, but this disease increases in intensity later in the season. Spots are similar to early leaf spot, but are darker in color and usually do not have the yellow halo.

Spores are abundant, especially on the lower leaf surface. Raised areas of spore production often appear in circular patterns.

Both types of leaf spot cause serious defoliation. They may occur simultaneously and can develop at any time during the season; but they tend to occur either early or late as their names imply. The most reliable test for distinguishing between early and late leaf spot is to check the color of the spots on the lower leaf surface. Early leaf spot will be brown and late leaf spot will appear black.

A. Early leaf spot B. Late leaf spot

3. Comparison of early and late leaf spot (*Cercospora arachidicola* and *Cercosporidium personatum*)

	Early leaf spot	**Late leaf spot**
Seasonal development	Early	Late
Shape of spot	Circular to irregular	Usually circular
Leaf surface where first and most spores produced	Upper	Lower
Color of spot on upper leaf surface	Light brown to black tending toward brown	Brown to black tending toward black
Color of spot on lower leaf surface*	Brown	Black

*This is the most reliable test.

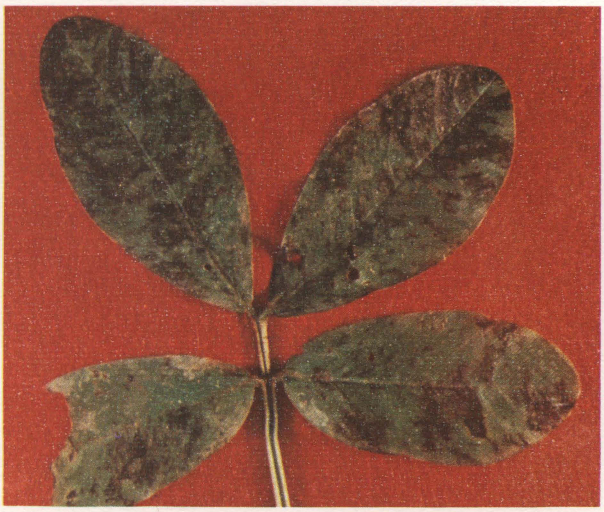
4. Web blotch showing distinct webbing symptoms (fungus—*Ascochyta* sp.)

Webbing or netting patterns produced by the web blotch fungus on the upper surface of peanut leaves is the most distinct of several symptoms produced. Webbing occurs when fungal strands grow just beneath the waxy cuticle on the leaf surface. The brownish fungal strands radiate from the point of infection in a random fashion, producing the web pattern.

Webbing occurs rapidly under some conditions and may cover an entire leaf without a blotch symptom. The environmental conditions that cause webbing to occur in the absence of other symptoms is not understood at this time. It is more common to see webbing occur along with the blotch symptom.

5. Web blotch showing a distinct blotch symptom (fungus—*Ascochyta* sp.)

Darker areas on the photograph illustrate the distinct blotch that occurs with this disease. Margins are irregular and spots assume a roughly circular pattern. Blotches are dark brown with a lighter-colored margin. When conditions are favorable for rapid disease development, the blotch area is surrounded by a grayish margin as shown by the next photograph. Varying degrees of webbing may surround the blotch.



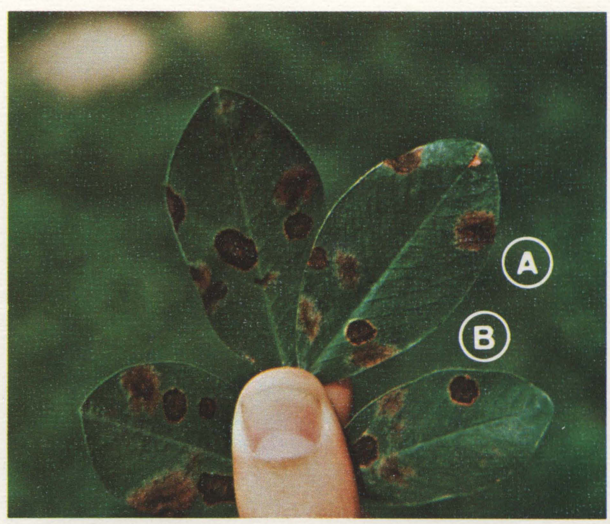
6. Web blotch showing webbing and blotching (fungus—*Ascochyta* sp.)

A wide range of symptoms develop with this disease. When conditions are favorable for rapid disease development, a tan spot surrounded by a pale gray margin develops. Close observation reveals that the pale gray area is made up of fungal strands radiating outward past the dark center of the spot.

Webbing produced by new and rapidly developing strands is less striking than that from older infections described earlier. Since symptoms do vary, growers are encouraged to observe a number of infected leaves and look specifically for webbing, which positively identifies this disease.

7. Web blotch compared to leaf spot (fungi—*Ascochyta* sp. and *Cercospora arachidicola*)

Web blotch symptoms differ from those of early or late leaf spot. Webbing has never been observed to be a symptom of early or late leaf spot. Also, margins of spots are much more distinct with the two leaf spots than with web blotch.



A. Web blotch B. Early leaf spot

8. Pepper spot (fungus—*Leptosphaerulina crassiasca*)

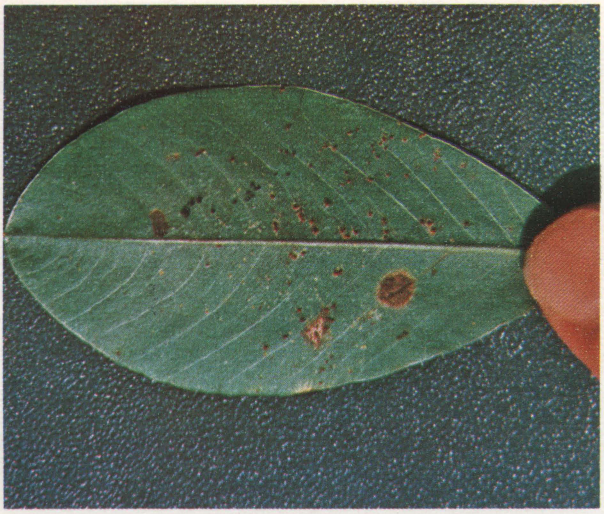
Pepper spot appears as a mass of dark brown to black spots on the leaf surface. They first appear as tiny flecks and then enlarge in diameter, but do not become as large as the spots caused by the leaf spot fungi. Unless infection is extremely heavy, they do not tend to run together to form larger spots, as is the case with the leaf spot diseases.

The pepper spot fungus appears to be a weak pathogen, but it is aggressive on weak plant tissue. This may explain why it is not considered to be a serious peanut disease. In southeastern states a leaf scorch symptom is associated with infection of this organism. Scorch has not been noted in Texas except when infection by one of the leaf spot fungi or damage by leaf hoppers has occurred prior to infection.

9. Rust on leaf (fungus—*Puccinia arachidis*)

Rust first appears as a yellowish-green fleck on the upper leaf surface. Almost simultaneously pustules or small, raised bumps appear on the lower leaf surface. As infections grow older and become more numerous, a yellow mottling or speckling occurs on the upper surface and numerous red to dark brown pustules are apparent on lower leaf surfaces.

Several other peanut diseases are often improperly identified as rust. True peanut rust always has pustules filled with spores on the lower leaf surface. Rubbing a white tissue or handkerchief across these pustules will reveal the reddish-brown spores.



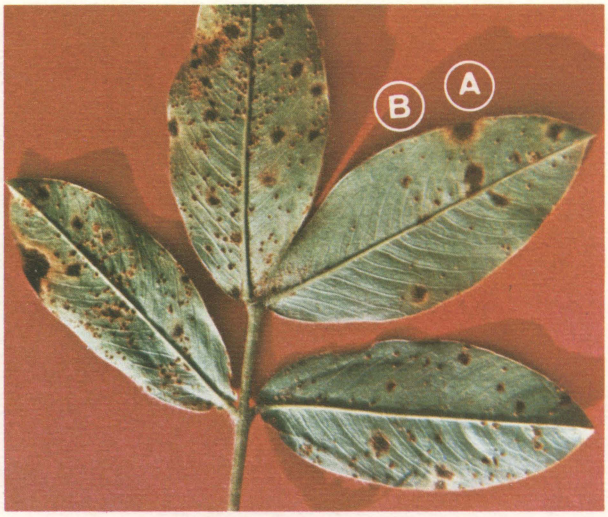
10. Close-up of rust-infected leaflet (fungus—*Puccinia arachidis*)

Pustules containing hundreds of reddish-brown spores are shown on the lower leaf surface. When liberated from these structures spores are transported by air to other leaf surfaces, where infection takes place if conditions are favorable. If pustules are not present, the condition may be caused by other diseases such as atmospheric scorch.

11. Rust compared to leaf spot (fungi—*Puccinia arachidis* and *Cercospora arachidicola*)

Rust symptoms differ from leaf spot. Comparing the size of leaf spots with rust pustules does permit one to gain a sense of size perspective, however.

The rust fungus does not overwinter on crop residue or in the soil, but is brought to peanut fields by southerly winds from Caribbean areas. Leaf spot fungi do overwinter in crop residue, and also can be wind-transported from other areas.



A. Leaf spot B. Rust

12. Spotted wilt of peanuts—leaf and stem terminal symptoms (virus)

This virus disease causes stunted plants less than half the size of healthy ones if early infection occurs. Distinct ring spots appear on older leaves, and new leaves are relatively small and rounded. Leaves are closer together than normal, resulting in a stubby, bunchy growth. Growing points of stems are yellow and stunted, and the number of flowers is reduced.

The virus is transmitted by thrips from weed hosts in Southeast Texas. It is not seed transmitted.

13. Spotted wilt of peanuts—pod dwarfing symptom (virus)

Infected plants do produce pods and seeds, but they are reduced in size and distorted in shape. This condition usually occurs at very low levels, but as much as 25 percent of the stand in one field has been affected.

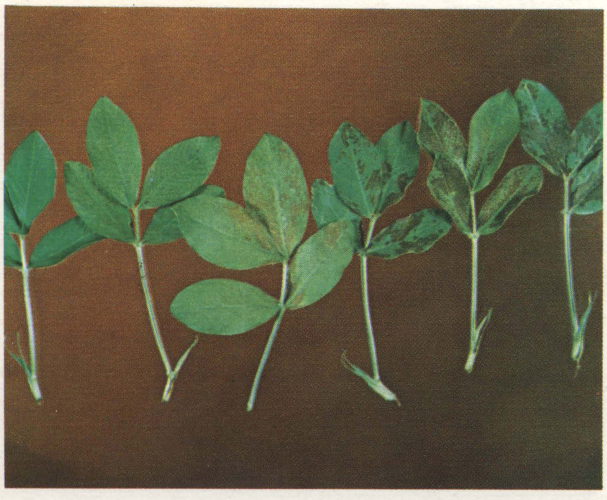
14. **Genetic abnormality** (genetic)

Variegated leaves are often found in fields of Spanish peanuts. This abnormal coloration on occasional leaves is considered to be genetic in origin and is not attributed to any type of disease-causing organism. For some reason, the green pigment (chlorophyll) fails to develop normally and the variegation occurs.

15. **Atmospheric scorch** (physiological)

Atmospheric scorch is thought to be caused totally or in part by ozone in the atmosphere. Ozone (O_3) is found in high concentrations in upper atmospheres. It is produced by sunlight penetrating smog in larger cities, and also is generated by lightning during thunderstorms. Damage in most peanut producing areas is thought to be caused by ozone from upper atmospheres being pulled down by thunderstorms and cool fronts. Most damage can be observed 4 to 5 days after such disturbances.

Damage first appears as a very slight burn on the upper leaf surface and progresses to a dark brown scorched area. Cells of the upper epidermis are most affected, but damage proceeds rapidly after secondary organisms invade the damaged tissue. Affected leaves eventually turn brown and drop from the plant. Spanish peanuts are more susceptible to this condition than runner types.



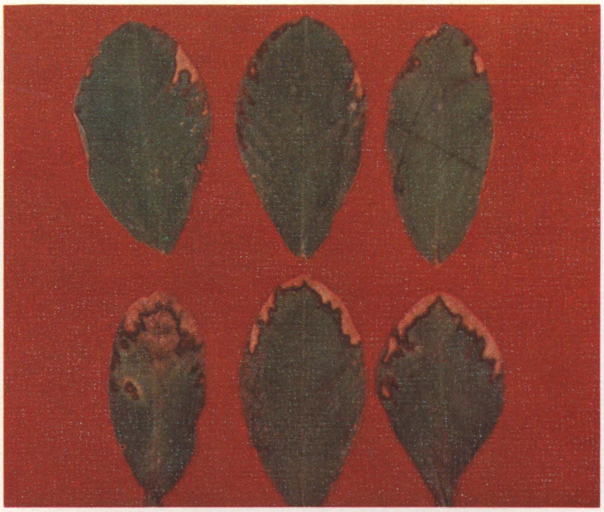
16. **Variation of symptoms of atmospheric scorch** (physiological)

Symptoms vary depending on ozone concentrations, length of exposure, environmental conditions at the time of exposure and the variety of peanut being grown. Appearance ranges from an off-color bronzing to a dark brown to black scorched area on the upper leaf surface.

Secondary fungal organisms rapidly invade the damaged tissues and these are thought to aggravate the condition. Symptoms appear to be more severe in parts of fields having higher levels of soil moisture. No data is available to indicate whether or not economic loss occurs from this damage. Planting tolerant varieties is the only means of control at this time.

17. Chemical burn

This marginal chemical burn occurred when a fungicide, insecticide and oil were tank-mixed. The insecticide used was not compatible with the fungicide and oil combination. Marginal burns also can occur from soil conditions that are unfavorable for root growth, or from toxic substances taken up by the roots.



18. Chemical burn

This burn resulted from the use of a fungicide at a higher rate than recommended. Also, less water was used per acre than recommended, making the chemical concentration higher. All chemicals applied to crops should be used in accordance with label recommendations to prevent plant damage.

Root, Stem and Pod Diseases

Diseases occurring at or beneath the soil surface often go unnoticed and are sometimes difficult to diagnose. Several soil organisms may work in combination and produce a symptom unlike those caused by single organisms. It is possible, however, to positively identify a number of soil associated diseases and to tentatively identify others as they occur in combination.

Producers should observe underground structures throughout the season for development of diseases that limit production. This will increase efficiency in planning specific control programs.

19. Seed decay and seedlings produced by weak or damaged seed (fungi and physiological)

Poor stands may result from seed decay or from weak or damaged seed. Soil contains numerous organisms that act to break down dead or dying plant tissue. Seed-protectant fungicides serve to fend off these organisms until the seedlings grow out of the protected zone.

Some seed may have a low food supply or be so damaged that weak or deformed seedlings are produced. Such seedlings emerge slowly and may even die before they can establish themselves.

20. Seedling disease (fungi—*Rhizoctonia solani, Pythium* sp., *Fusarium* spp. and others)

Certain soil organisms attack normal seedlings at various stages in their development. Brown to black spots occur on the plant part located between the root and stem. These spots may remain rather shallow in the tissues, or may completely girdle the plant and cause its death. This condition is common in some fields and is more devastating when soil temperatures are low.

21. Southern blight with overwintering sclerotia in different stages of development (fungus—*Sclerotium rolfsii*)

Southern blight can be positively identified by the presence of a white fungus accompanied by small, seed-like sclerotia that serve as overwintering bodies. The sclerotia first appear as tiny, white dots in the white fungal strands. As they enlarge they first become tan in color and then dark brown to black.

Sclerotia have hard covers that protect tightly wound fungal strands filled with food material. These structures are able to withstand adverse weather condtions and germinate when environmental factors are favorable for fungal growth.

Stems, pegs and pods are affected by the fungus. Limbs wilt and die when they are girdled by the fungus and pods are released to the soil when pegs are girdled. Affected pods are tan to light brown in color. The fungus develops at or very near the soil surface, presumably because of a high oxygen requirement.

22. Southern blight showing white fungal strands with overwintering sclerotia (fungus—*Sclerotium rolfsii*)

A mass of white fungal growth develops on dead plant tissues, such as fallen leaves, when the environment is warm and humid. The fungus develops on soil organic matter before attacking living plant parts.

Many fungi produce white fungal strands, but only the southern blight fungus produces sclerotia like those shown in the photograph. At times sclerotia may be sparse and hard to find, but their presence is the only means of positively identifying the disease. If a white fungal mass is present and sclerotia are absent, the affected plant part should be placed in a jar with a moist paper towel. If sclerotia develop in a few days, southern blight is confirmed.

23. Black mold of peanuts (fungus—*Aspergillus niger*)

This fungal disease—characterized by a black mold growth, may occur on planted seed or on mature plants. It is most destructive on germinating seedlings, where it produces dark brown spots. Older plant limbs or the entire plant may die. This damage is thought to result from infection during the early stages of plant development. Symptom development on older plants is much slower than on younger plants.

The fungus causing this disease is always black in color, and under magnification it appears as tiny ball-like structures perched on miniature stalks. This fungus can also invade tissues that have been mechanically damaged. It is not the fungus that produces aflatoxin.

24. Collar rot (fungus—*Diplodia gossypina*)

The fungus causing this disease may affect plants from the seedlings to the mature stage. The most obvious symptom is rapid wilting of branches and death of individual plants within the stand. With magnification, pimple-like fungal structures can be seen on diseased tissue.

High soil temperatures enhance the development of this disease. Many plants in a field may die if the fungus is in high concentration. In diagnosing this disease symptoms of southern blight or black mold should be ruled out.

25. Pod rots (fungi—*Pythium myriotylum, Rhizoctonia solani, Sclerotium rolfsii* and others)

Pod rots often are caused by several fungi acting together in a complex; for this reason it is often difficult, if not impossible, to attribute the disease to one organism. When planning potential control measures, however, it is advisable to attempt specific identification even though complete accuracy might not be possible. The following table is a general guide for making observations.

	Pythium myriotylum	**Rhizoctonia solani**	**Sclerotium rolfsii**
Pod color	Dark brown to black	Dark brown to black	Tan to light brown
Moisture level of affected pods	Watery when squeezed	Dry	Moist and slimy but not watery
Most favorable soil moisture levels	Over wet	Normal	Normal to dry
Controlled by PCNB (Terraclor)	No	Yes	Yes

While these three fungal organisms are primary, several others also may be involved. Fusarium, for example, almost always accompanies the organisms mentioned above.

26. **Pod rot and enlarged lenticels** (fungi and natural structures)

Pod rots often occur in soil that has been over watered by irrigation or natural rainfall. Pod rots can be confirmed by the presence of enlarged lenticels in the form of raised bumps on pod surfaces. In the photograph these appear as small, dark spots on kernels. These enlarged pores may be points for initial infection by certain of the pod-rotting organisms.

27. **Lenticel formation on pods** (natural structures)

The pods illustrated were taken from wet soil conditions and lenticels are white in color. These structures are similar to the enlargements that occur on Irish potatoes in water-saturated soils.

28. **Lenticel formation on pegs** (natural structures)

Lenticels form on pegs as well as on pods when soils are too wet. Growers often fear that the white structures are fungal growths, but this is not the case. Lenticels are localized enlargements while fungal strands are continuous.

29. Root knot nematode damage (*Meloidogyne arenaria*)

Root knot nematodes cause gall formations on roots, pegs, pods and nitrogen nodules. Light infestations may result only in small galls on the roots. These require close observation for identification. Nematode-induced galls are formed in the root structure itself and are not attached to the side of the root as is the case with nitrogen nodules.

Peanut plants severely affected by root knot nematodes are stunted and may be lighter in color. This nematode seriously damages yield potential.

Observing roots, pegs and pods is the most accurate method of diagnosis. Plants should be dug instead of pulled, since galls may be dislodged from the roots.

30. Root lesion nematode damage (*Pratylenchus brachyurus*)

Root lesion nematodes affect roots, pegs and pods, and can best be identified by the presence of small spots on pods. These spots are tan with a dark center. This nematode burrows and feeds inside plant tissue and can be extracted from hulls for microscopic observation. Damage caused by root lesion nematodes permits other organisms to enter, which eventually leads to pod deterioration.

31. Yellow mold (fungus—*Aspergillus flavus*)

This fungus produces a toxin called "aflatoxin," and infected peanuts are placed in Segregation III at the buying point. Exact identification of this fungus requires a compound microscope and an expert mycologist, because several other species are very similar. The fungus produces masses of yellow-green spores as shown in the photograph. Slight magnification shows ball-like structures supported on stalks. The illustration was made from a laboratory inoculated kernel and shows much more growth than would normally be found on peanuts coming directly from the field.

Diseases Not Illustrated and Described*

Foliage Diseases

1. **Botrytis blight** (fungus—*Botrytis cinera*)
2. **Phyllosticta leaf spot** (fungus—*Phyllosticta* sp.)
3. **Scab** (fungus—*Sphaceloma arachidis*)
4. **Powdery mildew** (fungus—*Oidium arachidis*)
5. **Melanosis** (fungi—*Macrosporium* sp. and *Alternaria* sp.)
6. **Peanut stunt** (virus)
7. **Peanut mosaic** (virus)

Root, Stem and Pod Diseases

1. **Cylindrocladium black rot** (fungus—*Cylindrocladium crotalariae*)
2. **Verticillium wilt** (fungus— *Verticillium albo-atrum*)
3. **Blackhull** (fungus—*Thielaviopsis basicola*)
4. **Northern root knot** (*Meloidogyne hapla*)
5. **Sting nematode** (*Belonolaimus longicaudatus*)
6. **Ring nematode** (*Criconemoides* spp.)

*These and certain other peanut diseases were not illustrated and described, either because they do not occur or only cause minor damage in Texas.

How to Get Additional Assistance in Diagnosis

If an unfamiliar disease is encountered that is not adequately described in available material, the county Extension agent should be contacted. If it has previously occurred in the county he can probably diagnosis it accurately. If he is unable to identify it, he can send the specimen to the Plant Disease Diagnostic Laboratory or the Plant Nematode Detection Laboratory for analysis. Accurate diagnosis is essential to the selection of effective disease control practices.

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