Soybean Disease and Nematode Identification Field Guide

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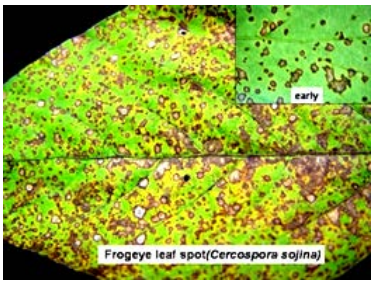

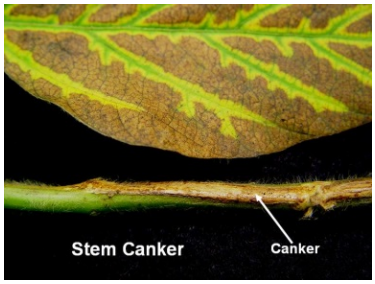

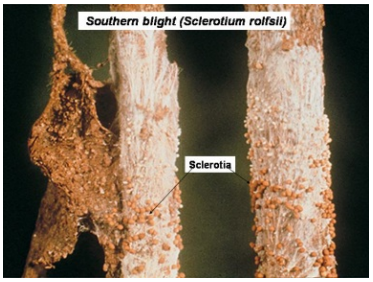

Extension

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Frogeye Leaf Spot (FLS)

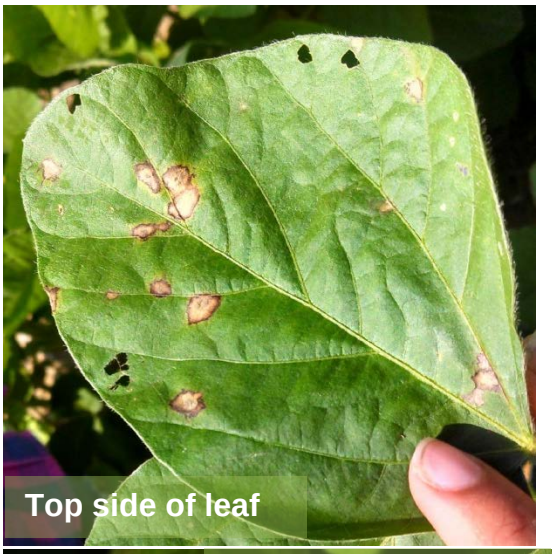
(*Cercospora sojina*)

Symptoms:

- **Leaf lesions are circular with a purple margin around a tan/grey center. Lesions begin as dark, water-soaked spots on the younger leaves. As lesions age, the centers become ash-gray-to-light-brown. Sporulating lesions on the lower surfaces of leaves are darker and have light-to-dark-gray centers with clusters of conidiophores and thin, reddish-brown margins. Non-sporulating older lesions are light-to-dark-brown, translucent, and have white centers containing minute, dark stromata. These lesions may coalesce to form larger, irregular spots.**

Management:

- **Plant FLS resistant varieties**
- **Timely fungicide application when warranted will control disease**



Southern Stem Canker

(*Diaporthe phaseolorum* var. *meridionalis*)

Symptoms:

- **First symptoms of stem canker appear as small reddish brown spots on stems near a lower node. These spots develop into cankers that can be several inches long running up the stem from the point of infection but only on one side (Picture 1 & 2). As the plant dies and the stem turns brown, the cankers are difficult to distinguish from the rest of the stem tissue.**
- **Leaf symptoms first appear as yellowing between the veins being more apparent on one side of the affected leaves (Picture 3). These leaves later turn brown and die but remain stuck to the stem, similar to plants affected by charcoal rot. Affected dry plants can easily break over when pushed. The pith of the stems will turn a light brown instead of remaining white and healthy (Picture 4). In some cases, the *Dectes* stem borer may have caused a dark- brown pith.**

Management:

- **Stem canker resistant varieties should be planted especially in fields that have had a history of stem canker. Infected crop debris can cause disease up to 18 months; hence a 2 year rotation is necessary to rid fields of stem canker.**

Sudden Death Syndrome (SDS)

(Soil-borne, *Fusarium solani* f. sp*. glycines)*

Symptoms:

- **Usually begin during the flowering stage and get progressively worse through R6. First appear as small yellow spots (Picture 1) in the upper leaves and progress into yellow streaks and then become necrotic with only the veins remaining green (Picture 2). The leaves may fall and leave the petioles attached. The foliar symptoms may resemble those of stem canker, charcoal rot, and tebuconazole burn.**
- **Roots of infected plants are usually rotted, and plants can be easily pulled out of the soil. The pith tissue will remain white, while the water-conducting tissue (xylem) will have a gray-to-brown color (Picture 3), extending from the root area into the stem. Many times SDS symptoms will be more severe in the presence of the soybean cyst nematode and may be worse after rotation with corn that had severe stalk rot the previous year.**

Management:

- **SDS resistant varieties should be planted especially in fields that have had a history of SDS. Cultural practices that improve drainage in low spots, reduce soybean cyst nematodes, or remove soil compaction may lessen SDS severity as well as delaying planting or using an early-maturing cultivar.**


Picture 1


Picture 2


Picture 3

Soybean Rust (SBR)

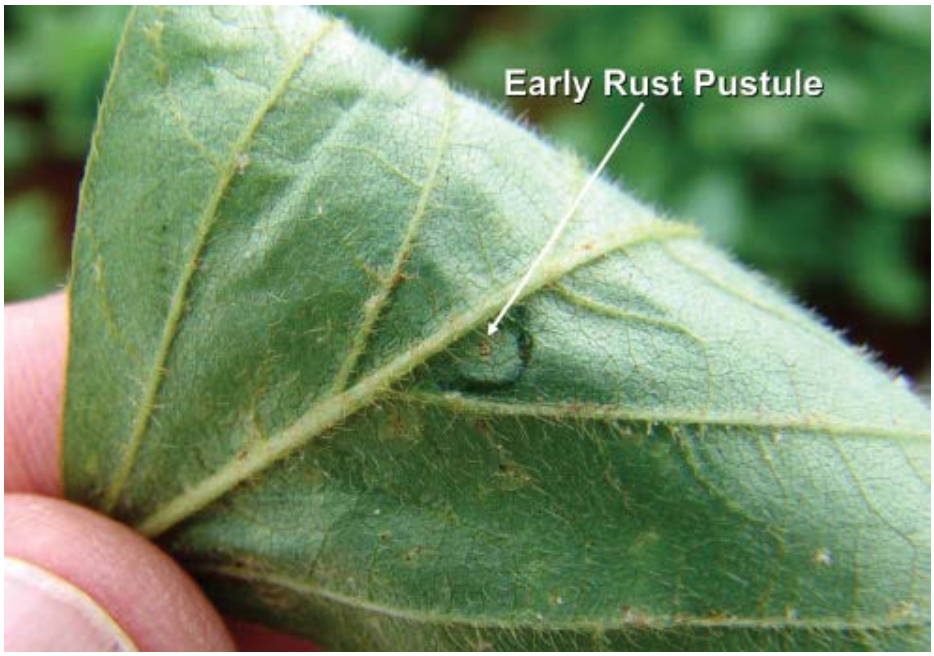
(*Phakopsora pachyrhizi)*

Symptoms:

- **Raised pimple-like structures called uredinia (volcanoes) develop in angular lesions, mostly on the underside of leaves, and release spores through central holes called "ostioles". Uredinia first appear on leaves in the center and lower canopy.**
- **Lesions resemble those of bacterial pustule, but differences can be seen with a 30X hand lens or a low power microscope. The opening in the pimple-like structure of bacterial pustule is an irregular crack with no rust-like spores. Uredinia circular openings and spores inside are diagnostic. Irregular dark brown leaf spots caused by Septoria brown spot can also be confused with soybean rust. However, those lesions are flat and do not develop raised pustules or ostioles.**

Management:

- **Timely fungicide application when warranted will management yield loss from SBR infection.**



Septoria Brown Spot

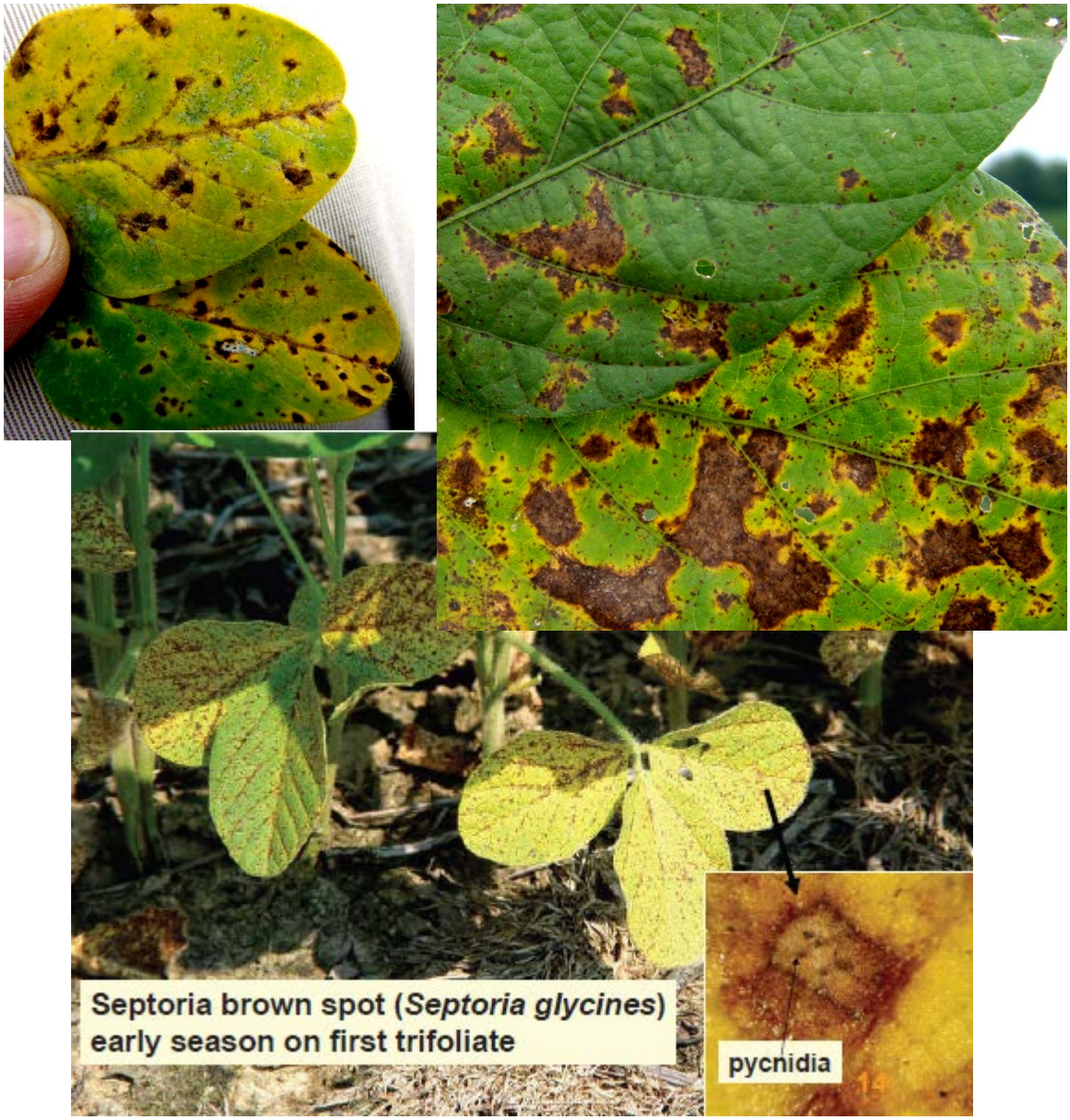
(Septoria glycines)

Symptoms:

- **Irregular, dark brown spots appear on upper and lower leaf surfaces of both unifoliate and trifoliate leaves. Adjacent lesions may coalesce to form irregularly shaped blotches. These lesions darken until they become blackish-brown. During wet, warm weather, lesions rapidly spread to all leaves and cause premature defoliation.**
- **Small brown lesions can occur on stems, branches, petioles and pods but are not sufficiently distinct to be diagnostic as herbicide burns early in the season look very similar.**

Management:

- **Timely fungicide application when warranted will control disease.**



Cercospora Blight

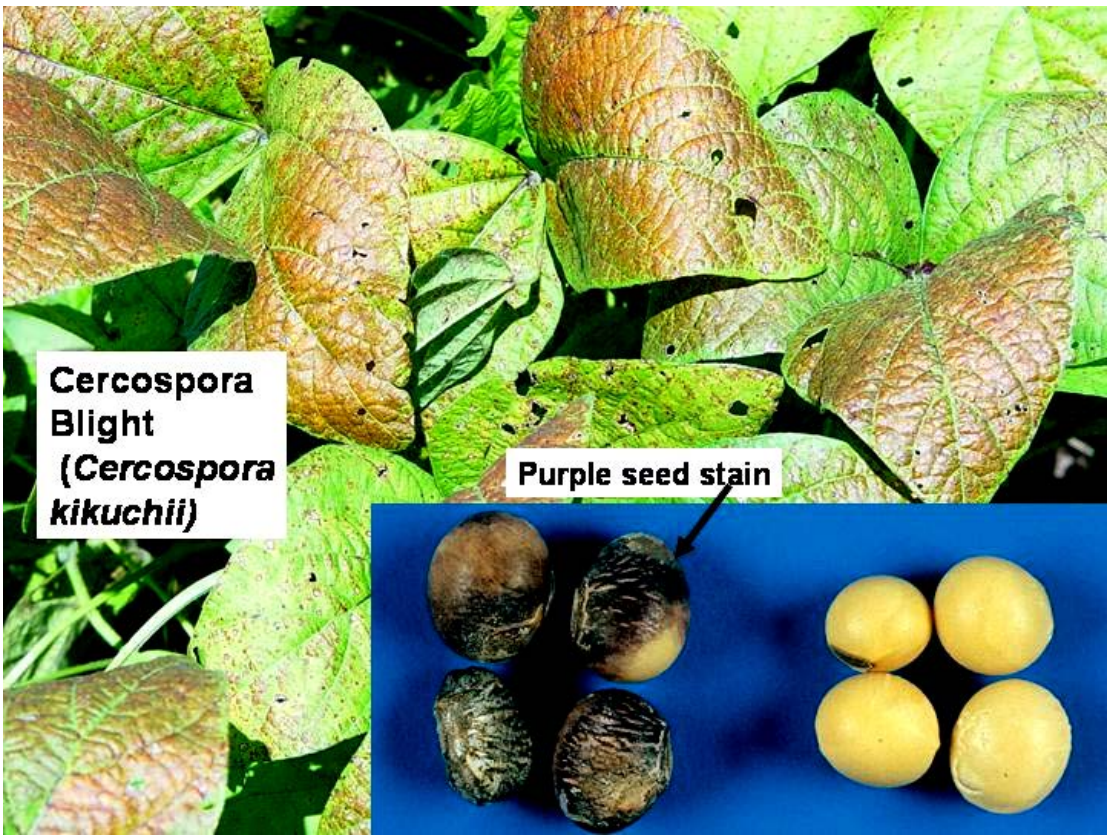
(*Cercospora kikuchii)*

Symptoms:

- **Upper leaves exposed to the sun develop light-to-dark-purple areas, depending on variety. This discoloration can deepen and extend over the entire upper surfaces of affected leaves, giving them a leathery, dark, reddish-purple appearance, highlighted with bronzing.**
- **Numerous infections cause rapid chlorosis and necrosis of leaf tissues, resulting in defoliation, starting with the upper leaves. These symptoms are often mistaken for early senescence.**
- **Purple seed stain varies from pink or pale purple to dark purple. Infected seed may not show any symptoms.**

Management:

- **Plant cultivars with resistance.**
- **Timely fungicide application when warranted will control disease.**



Charcoal Rot

(Macrophomina phaseolina)

Symptoms:

- **Appear during the reproductive stages of soybean development. Leaflets are small and show loss of vigor. Later leaves yellow, wilt, and turn brown but remain attached to the petioles, as in stem canker.**
- **Infected plants mature earlier and develop small, black microsclerotia in the vascular elements and may be so numerous that they resemble a sprinkling of finely powdered charcoal, causing a grayish-to-black discoloration of the tissues beneath the epidermis on the lower stem and taproot (Picture 1) and often in the pith of the stem. Black streaks in the woody portion of the crown may also be produced.**
- **Yield can be severely reduced due to fewer and smaller seed, which are usually infected. Soybeans are affected more severely where soils are lighter with poor moisture-holding ability.**

Management:

- **Moderately resistant cultivars should be planted as well as those that do not have late reproductive growth stages that coincide with periods of drought stress and high temperatures. Cultural methods that conserve soil moisture and maintain good fertility levels should be used as well as avoiding high seeding rates. Fields heavily infested should be rotated with less susceptible hosts, such as cereals or cotton, for 1 or 2 years; with corn or grain sorghum rotation must be for 3 years.**

Anthracnose

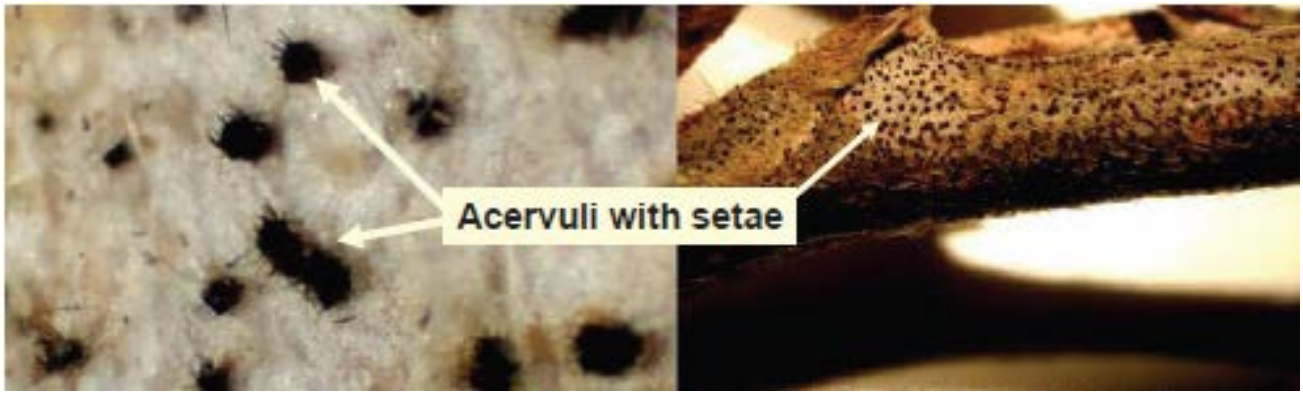
(*Colletotrichum truncatum)*

Symptoms:

- **Early symptoms may develop after long periods of humid, wet weather. Necrosis of laminar veins, leaf rolling, petiole cankering, and premature defoliation may occur.**
- **Appear during the early reproductive stages on stems, pods and petioles as irregularly shaped, brown areas and may resemble pod and stem blight. However, the black fruiting bodies (acervuli) are not arranged in rows as in pod and stem blight. Anthracnose also produces diagnostic minute black spines (setae) that can be seen with the unaided eye or with a hand lens. At maturity, unprotected plants are covered with acervuli on pods, stems and petioles.**

Management:

- **Timely fungicide application when warranted will control disease.**



Southern Blight or Sclerotium Blight

(Sclerotium rolfsii)

Symptoms:

- **A sudden yellowing and death of infected plants is usually the first symptom that is noticed in the field. Leaves of infected plants turn brown, dry and often cling to the dead stems.**
- **Characteristic of Southern Blight is the white fan-like mat of fungal mycelium that forms on the base of the stem and on the old debris near the infected stem. Many white, tan or brown spherical sclerotia about the size of bird seed form on infested plant material and on the soil surface.**
- **Usually affects only scattered plants in one to two feet in the row. Is worst in hot, humid weather. All soybean varieties as well as many other species of plants are susceptible.**

Management:

- **Alternating soybean or other susceptible crops with nonhost crops such as maize, grain sorghum, wheat, or pasture grasses or clean fallow for 2 years may prevent the buildup of inoculum to damaging levels.**

Phytophthora Rot

(Phytophthora sojae)

Symptoms:

- **May occur in soybeans at any stage of development, but early symptoms include seed rots and pre- and post- emergence damping-off.**
- **Infected older plants of susceptible varieties show a yellowing between the veins and leaf margins and a chlorosis of the upper leaves, followed by wilting. Leaves remain attached after the plants die.**
- **A brown girdling of the stem, progressing up the stem as high as the 10th node, is very diagnostic of this disease.**
- **Foliar blight has been noted after heavy rains in soybeans in the early vegetative stages. Older plants may be resistant to foliar blight.**

Management:

- **Resistant cultivars, seed treatments containing metalaxyl or mefenoxam, and improved drainage and tillage are effective management options when warranted.**

Downy Mildew

(Peronospora manshurica)

Symptoms:

- **Pale-green-to-light-yellow spots appear on the upper surfaces of young leaves and enlarge into pale-to-bright-yellow lesions. Older lesions turn grayish-brown-to-dark-brown with yellowish-green margins and may finally become entirely brown and have an appearance similar to frogeye leaf spot.**
- **On the under surface of the older lesions, grayish tufts of fungus (sporangiophores) form, making it easy to distinguish downy mildew from other foliar diseases. Severely infected leaves turn yellow and then brown, curl at the edges and drop prematurely.**

Management:

- **Resistant cultivars and rotating with a nonhost crop for 1 year or more are effective management options when warranted.**

Soybean Cyst Nematode (SCN)

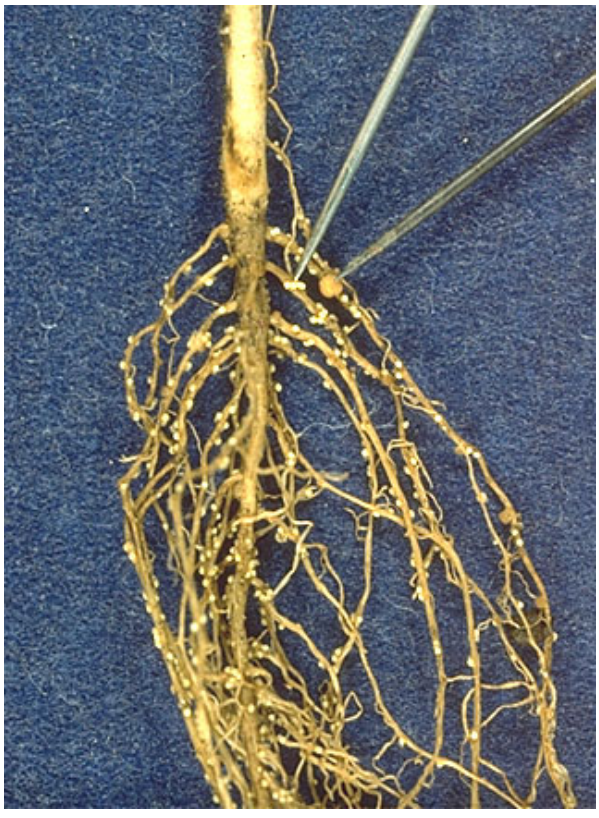
(*Heterodera glycines*)

Symptoms:

- **Slow canopy closure caused by the nematode is often diagnosed as herbicide failure early in the season. Plant height is also affected, resulting in short plants next to tall plants. Poor fertility can enhance above-ground symptoms, mimicking potassium deficiency, nitrogen deficiency and iron chlorosis. Poor stands and plant death are possible.**
- **Young female SCN can be found on the plant roots in the field most readily when plants begin to flower, if the roots are dug. Females turn brown as they die and are released into the soil, making older cysts harder to detect.**
- **Common interactions with SDS. Other associations observed are with charcoal rot and root rots such as Rhizoctonia and Fusarium.**

Management:

- **Management begins with confirming the presence of *H. glycines* by sampling plant roots and soil near roots. Depending on the HG type/race present some cultivars contain resistance, but an integrated management approach is needed which includes crop rotation, using resistant cultivars, nematicides, and cultural practices that reduce plant stress.**



Tebuconazole phytotoxicity

(Examples: Folicur, Orius, Uppercut)

Symptoms:

- **Look very much like those of SDS or early stem canker with interveinal chlorosis and necrosis. However, symptoms are not progressive. Leaves that did not receive any spray will not show any symptoms, nor will new upper leaves. Root and stem tissues are not affected.**
- **May begin 2-3 weeks after spraying.**
- **Soybean varieties differ in their susceptibility.**
- **Hot, dry weather conditions at the time of spraying and additions of other adjuvants or pesticides may increase the severity of the symptoms.**
- **No yield decrease has been noted in research plots in the past.**