

Discolored Soybean Seed

By Laura Sweets

This may be a year when soybean seed discoloration is a widespread problem in Missouri. Soybean diseases are one of several factors which can cause discoloration and deterioration of soybean seed. But soybean diseases are only one of the factors which may be involved in this year's problem. Much of the state has been unusually wet for most of the season. The late season soybean diseases which can lead to discolored soybean seed tend to be favored by wet conditions including frequent rains, heavy dews and high humidity. Discoloration of soybean seed this year appears to be the result of environmental stress compounded by late season stem and pod diseases.

When the late season pod and stem diseases occur, maturing plants have a blackish cast and black to gray spots, blotches and streaks may cover stems, branches and pods. The late season diseases lead to increased problems with discolored and damaged soybean seed. Purple seed stain; a general blotchy brown discoloration that might be the result of the *Cercospora* or *Colletotrichum* species which cause anthracnose and tipblight; bleeding hilum which can be caused by virus diseases such as soybean mosaic and bean pod mottle; a white mold growth which could be *Phomopsis* seed decay or secondary fungi entering through pods damaged by insects are all showing up in beans. The diseases which contribute to discolored soybean seed are usually favored by wet conditions late in the season. Weather conditions from now through harvest will have a major influence on how severe discoloration and deterioration of soybean seed is this season.

Symptoms of the seed damage which may result from *Phomopsis* seed decay, purple seed stain, frogeye leaf spot, virus diseases and *Colletotrichum* anthracnose and tipblight are described below.

Phomopsis seed decay: *Phomopsis* seed decay results when the fungi which cause pod and stem blight move from the stems and pods onto the seed. Plants infected with pod and stem blight may be stunted and have discolored stems.



Phomopsis seed decay.

Black pycnidia or fruiting bodies of the fungi *Phomopsis sojae* or *Phomopsis longicolla* develop on the lower portion of the main stem, branches and pods as plants reach maturity.

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The pycnidia may be limited to small patches usually near the nodes or may cover dead stems and pods. On stems, the pycnidia are usually arranged in linear rows while on pods they are randomly scattered. Prolonged periods of warm, wet weather during flowering and pod fill favor the development of pod and stem blight. If conditions remain warm and wet, the fungus may grow through the pods and infect the seed. Infected seed is oblong or misshapen and may have a white moldy appearance.

Purple seed stain: *Cercospora kikuchii* can infect soybean seeds, pods, stems and leaves but is most commonly found on the seed. However, during the last several years leaf spot and leaf blight caused by this fungus have been prevalent in parts of the state. Leaf blight occurs on the uppermost leaves and begins as reddish purple to reddish brown angular to somewhat circular lesions on the soybean leaves. These



Purple seed stain.

lesions may coalesce to kill larger areas of leaf tissue. The entire uppermost trifoliolate leaf and petiole may be blighted and brown. *Cercospora* leaf spot may develop as a premature yellowing and then blighting of the youngest, upper leaves over large areas of affected fields. Brown lesions or spots are usually evident in the yellowed tissue. In most fields symptoms do not progress down the plants more than one to two nodes. Pods at the uppermost nodes may develop round, reddish purple to reddish brown lesions. Infected seed show a conspicuous discoloration varying in color from pink to pale purple to dark purple. The discoloration may range from small specks to large blotches which cover the entire surface of the seed coat. Warm, humid weather favors disease development. Yields are usually not reduced but a high percent of seed stain may be evident at harvest.

Frogeye leaf spot: *Cercospora sojina* causes frogeye leaf spot on soybean. Symptoms occur primarily on leaves although the causal fungus may also infect stems, pods and seeds. Lesions are small, circular to somewhat angular spots that develop on the upper leaf surfaces. Initially the spots are dark and water

soaked in appearance. As the lesions age they develop a dark reddish-brown border. The center of the lesion becomes light brown to light gray in color. Lesions may merge to kill larger areas of the leaf. Heavily spotted leaves may wither and drop prematurely. Stem lesions usually develop later in the season. Young stem lesions are deep red with a narrow, dark brown to black margin. As the stem lesions age, the centers become brown to smoky gray in color. Lesions on pods are circular to elongate, slightly sunken and reddish brown. The fungus can grow through the pod wall to infect maturing seed. Infected seeds may show discoloration of the seed coat that ranges from small specks to large blotches of light gray to dark gray or brown.

Virus diseases: There are several virus diseases which may occur on soybean in Missouri including bean pod mottle, soybean mosaic and tobacco ringspot or budblight. Of these, soybean mosaic virus and bean pod mottle virus are most likely to cause symptoms on the seed. Seed infected with soybean mosaic or bean pod mottle virus may have a symptom called bleeding hilum. This is a discoloration, usually black or dark in color that bleeds from the hilum down the sides of the seed. The affected area may be quite small and near the hilum or may be quite extensive and cover most of the seed. It is important to keep in mind that bleeding hilum is also a genetic characteristic of certain soybean varieties. The intensity of the discoloration can be influenced by environmental conditions during the growing season.

Colletotrichum anthracnose and tipblight: *Colletotrichum truncatum* and several other *Colletotrichum* species cause anthracnose of soybean. Typically, anthracnose is a late season stem and pod disease of soybean. Symptoms occur on stems, pods and petioles as irregularly shaped, light to dark brown spots, streaks or lesions. Eventually black fungal structures may be evident in these lesions. Anthracnose may also cause a tipblight. The tipblight phase of anthracnose causes a yellowing or browning of the uppermost leaves and pods. The blighted tips may dry up and die prematurely. This fungus may also infect seed. Seed may be smaller than normal and severely infected seed may be a moldy, dark brown in color and shriveled. Anthracnose is favored by warm, wet weather, and the tipblight phase of anthracnose is most likely to occur after a rainy period.

The incidence and severity of the soybean diseases which cause seed discoloration and deterioration are greatly increased by warm, wet conditions late in the season. For grain crops there are no potential rescue treatments. Fields should be harvested as soon as possible to prevent further seed damage.

Many of the pathogens causing seed discoloration and deterioration can survive on soybean seed. Heavily infected seed, if planted, could produce diseased seedlings resulting in

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stand problems. Therefore, seed from infected fields should not be saved for planting. If infected seed must be used for planting, it should be thoroughly cleaned, a sample submitted for a germination test (preferably a stress test) and a fungicide seed treatment applied.

Many of the pathogens that cause these diseases may also survive in infested residues left on the soil surface. Thus, crop rotation is an important means of preventing or reducing disease outbreaks. At least one year between soybean crops is

recommended. Varieties may differ in their reaction to these various diseases and, if possible, good quality seed of resistant varieties should be planted.

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