Anthracnose of Dent Corn

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Prior to 1972, corn anthracnose, caused by the fungus Colletotrichum graminicola, was considered a minor disease in Indiana. The fungus has occurred in the state for many years, but damage was negligible. In fact, the fungus was considered more of a saprophyte than a pathogen. However, with severe disease outbreaks on sweet corn in Benton County in 1972, anthracnose has been increasing in dent corn, and the disease syndrome has been changing. Sufficient changes have been observed that anthracnose is now considered an economically significant disease of dent corn in Indiana.

When suitable environmental conditions prevail, anthracnose may occur at any time during the growing season and may attack any part of the corn plant. The fungus may cause a seedling blight, crown rot, root rot, leaf blight, top dieback, stalk rot, or kernel infection. To date, the stalk rot and leaf blight phases of the disease have been the most widespread and important. Anthracnose is more severe when cloudy, warm, humid weather occurs with abundant rainfall in July or early August.

Anthracnose Leaf Blight

In 1972, anthracnose was severe on sweet corn in some Benton County fields, but it occurred only as a minor leaf blight on dent corn plants that were growing in or near the affected sweet corn fields. On dent corn, the leaf blight phase occurred early in the growing season on the lower-most leaves, seemed to disappear during the summer, then reappeared as a minor foliar disease after tasseling. From 1972 to 1977 the leaf blight phase of this disease was found with increasing frequency and severity and was observed in all areas of the state. During August 1977, the leaf blight phase caused premature leaf death of entire plants in widespread areas of southern and eastern Indiana. Fortunately, severe infection occurred well after tasseling in 1977, and yield losses from this phase of the disease were relatively minor.

Symptoms of anthracnose leaf blight are first observed as pin-point yellowish flecks. Flecks later develop into circular to oval lesions which may:
a. range in size from 1/4 to 3/4 inch or larger
b. have a yellow to yellow-orange border
c. exhibit concentric zones or rings of lesion development
d. be found on all parts of the leaf
e. exhibit tiny black specks in the center of the lesion or in a ring within the lesion. The black specks are structures of the fungus in which spores are produced, (Figures 4-6)
f. coalesce
g. kill leaves under conditions of severe infection

**Anthracnose Stalk Rot**

A major change of anthracnose in dent corn has been the development of the stalk rot phase of the disease. It was first found severe in Indiana during the first week of September 1975 in Carroll County. Individual fields were severely lodged as a result of stalk infections by the anthracnose fungus. During the fall of 1975, varying degrees of anthracnose stalk rot were found in scattered areas of the state. The stalk rot phase of this disease was minor during 1976 because of the dry conditions during July and August. However, anthracnose stalk rot was widespread throughout the state in 1977 as a result of the wet weather during July, August, and September. The disease was especially severe in southern Indiana where more rainfall was received. Plants prematurely killed by anthracnose may produce lightweight, chaffy ears, although, to date, most anthracnose stalk rot losses have resulted from the inability to harvest lodged corn.

Symptoms of anthracnose stalk rot generally appear after tasseling as narrow, vertical, watersoaked or oval lesions on the stalk rind. These lesions become tan to reddish brown then dark brown to black with age (Figures 1 thru 4). Black specks associated with spore production are often found on stalk rind (Figures 4 thru 6). Lesions may coalesce and produce relatively large brown to black blotchy areas on the rind. Lesions may or may not be slightly sunken. Leaf sheaths must often be removed to see these symptoms. Pith tissues may be rapidly invaded, turn brown to black and become disintegrated. Premature killing of plants may occur when infection takes place prior to plant maturity. Severe lodging can result. Lodging may occur at any point below the ear. Generally, lodging from anthracnose stalk rot is found higher on the stalk than with other stalk rot diseases.

### Anthracnose Top Kill

The anthracnose fungus may also attack stalk tissues above the ear resulting in a premature death of the top portion of plants. This phase of the disease generally occurs after tasseling and frequently is seen before the stalk rot phase of the disease. Top killing was first observed on scattered plants in a few southern Indiana fields in August 1974. This phase of the disease was more widespread in 1975, but it did not occur in 1976 because of the dry weather. During 1977, anthracnose top killing occurred in individual fields throughout most areas of the state; it was especially prevalent in the southern half. Yield losses from this phase of the disease are not currently known, but early top killing possibly leads to light weight, chaffy ears. Anthracnose stalk rot may or may not occur with top killing.

The main symptom of anthracnose top killing is a premature death of all or a portion of the plant above the ear. Symptoms on the stalk rind above the ear are similar to those described for the stalk rot phase of the disease, except in top killing the symptoms are less pronounced.

### Anthracnose Kernel Infection

To date, kernel infection from the anthracnose fungus has been minor. The
Figures 1-6: 1 and 2) Arrows point to different types of black, shiny areas of rind discoloration which are characteristic symptoms of anthracnose stalk rot at the end of the growing season. Note that the areas of discoloration run vertically along the rind. 3) An enlargement of an internode from the stalk in Figure 2. Again note the shiny vertical black lines of discoloration characteristic of anthracnose. 4) An enlargement of an area of the internode shown in Figure 3. Note that the black areas actually appear as "dots" or blotches of discoloration. Unless the black areas become coalesced this can be observed with the eye or with a hand lens. 5 and 6) Enlargements of an area of rind from Figure 4. Structures for the production of spores by the fungus are shown. These structures, called acervuli are often found associated with the shiny black areas on the stalk rind. Note the presence of black needle-like bodies, called setae, which surround each spore-producing structure almost in the manner of a crown of thorns. Note also that these needle-like structures can be viewed with a low power (10X) hand lens.
most severe infection of kernels under field conditions has been about 2 per cent of the kernels infected. Kernel infection appears as dark brown to black streaks which run lengthwise on the kernel. Severely infected kernels may be completely discolored. Poor seed germination, seedling blight or death of young plants from seed-borne anthracnose are identifiable only under laboratory conditions.

ANTHRACNOSE DISEASE CONTROL

The fungus that causes corn anthracnose survives extremely well in diseased corn residues left on the soil surface. The fungus does not survive as well on corn residues that are buried, and it survives poorly in the soil in the absence of corn residues. In Indiana the anthracnose fungus that attacks corn is not known to attack sorghum or other crops. There are differences in hybrid reaction, but, to date the reasons for these differences are not clearly defined. In Indiana, the popular inbreds Mo-17, C-123, and B-73 appear to be highly susceptible. In years where disease pressure is not extremely high, the disease appears to be reasonably controlled by crop rotation or sanitation. However, in years where abundant rainfall occurs with extended periods of cloudy, warm, humid weather in July and August, such as 1977 in southern Indiana, these control measures do not appear to be as effective.

Disease control suggestions include:

1. Where corn will follow corn and on land that cannot safely be plowed because of erosion problems, choose hybrids that appear to have the most disease resistance in your area.

2. Crop rotation. One year out of corn appears to offer reasonably good control of anthracnose in most years. This is the most effective control method on soils that should not be plowed because of erosion problems.

3. Sanitation by first discing the stalks then plowing under all corn residues appears to offer reasonably good control of anthracnose in most years. This control is important where corn will follow corn, and on soils that can safely be plowed without causing an erosion problem. Fall plowing is more effective than spring plowing. Reduced tillage practices such as chisel plowing or other systems that leave corn residues on the soil surface are not effective in disease control.

4. Where the leaf blight phase of the disease occurs either in the spring or after tasseling, those fields should be periodically checked for the development of the stalk rot phase. If stalk rots develop, the fields should be harvested as soon as possible to reduce lodging losses.