

WVU Extension Service Pest Information Study Guide

Corn Diseases

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Corn diseases cause yearly losses from 2 to 7%, but, in some localized areas; one or more diseases may become acute and destroy a larger percentage of the crop.

Ear and kernel rots decrease yield, quality, and feeding value of the grain. Stalk diseases not only lower yield and quality, but also make harvesting difficult. When leaves are damaged by disease, the production of carbohydrates to be stored in the grain is decreased; immature, chaffy ears result.

Corn diseases may be classified as parasitic and non-parasitic. Fungi, bacteria, or viruses cause most parasitic (infectious) diseases of corn.

Non-parasitic disorders result from unfavorable climatic and soil conditions. Nitrogen, phosphorus, or potassium deficiencies cause some of the most frequently observed non-parasitic corn disorders. Occasionally, corn may suffer from lack of essential minor elements in the soil such as zinc or sulfur.

Factors Affecting Corn Disease Development

Corn diseases, like those of crops, vary in severity from year to year and from one locality or field to another, depending on environment, host resistance, and causal organism. For example, if the environment is favorable for disease and the causal organism is present but the host is highly resistant, little or no disease will develop. Similarly, if the causal organism is present and the host is susceptible but the environment unfavorable, the disease may not appear.

Environment -- Many corn diseases develop best when moisture is abundant during the growing season. Rain or heavy dew is necessary for spores of disease-producing fungi to germinate and to penetrate the plant. Temperature and moisture of both soil and air may affect the development of corn diseases.

Soil fertility may affect the severity of some infectious diseases of corn, particularly certain stalk rots. Fertilizing to maintain soils at highly productive levels produces vigorous plants that do not die prematurely. However, since some diseases are not greatly affected by soil fertility, fertile soil does not always yield healthy corn plants.

Resistance of Host -- Disease resistance differs among inbred lines and hybrids. Their inherent resistance or susceptibility often may determine whether an epidemic of a given disease will occur.

Causal Organisms -- No disease epidemic will occur if the specific causal organism fungus, bacterium, or virus is absent, even though the environment is favorable and the host susceptible. The causal organisms are as variable in their virulence as the hosts in their relative resistance are.

Corn Diseases

<http://www.ent.iastate.edu/imagegal/plantpath/>

Corn diseases can be managed by using disease-resistant hybrids or by applying fungicides to the seed. Other practices such as spraying plants with fungicides, adjusting soil fertility with fertilizers, and maintaining good drainage also may be used with certain diseases and in certain circumstances.

Incorporating genetic resistance into agronomically desirable hybrids seems to be the most efficient and permanent means of controlling corn diseases. However, none of the hybrids in use are highly resistant to all diseases, and some are extremely susceptible. In developing disease-resistant hybrids, the plant breeder and plant pathologist can develop adapted, high-yielding corn hybrids that are resistant to the major diseases in a given area. When a disease poses a serious economic threat, consult the West Virginia University Extension Service for recommendations on the use of resistant hybrids for the particular area.

The treatment of seed corn with fungicide either in dust or slurry may manage seed rot and seedling diseases, but won't manage any other diseases.

Crop rotation and destruction of diseased plant parts have been suggested as control measures for certain plant diseases. Such practices are most effective where the crop is grown in a limited area, or if the specific disease-producing agent is strictly soilborne. In areas where corn is extensively grown, it is unlikely that destroying diseased plant parts can be sufficiently thorough to be effective. With few minor exceptions, crop rotation has little effect on reducing corn diseases. In river bottom fields where, by necessity, corn often is grown several years in succession, some diseases appear to be no more prevalent than where rotation is practiced.

Rotation is probably more beneficial to corn in improving tilth and conserving fertility than in reducing diseases.

Maintaining well-balanced soil fertility can help fight some corn diseases. Severity of certain stalk rots depends not only on the specific host, but also on the particular mineral deficiencies in the soil. Since yield is a primary factor in corn production, building and maintaining maximum fertility levels is important.

Seed Rot and Seedling Blight

<http://plant-disease.orst.edu/disease.cfm?RecordID=354.00000>
<http://www.ent.iastate.edu/imagegal/plantpath/corn/seedis>
<http://www.ent.iastate.edu/imagegal/plantpath/corn/seedtreat>
<http://www.ent.iastate.edu/imagegal/plantpath/corn/1785.2soilbornefungi.html>
<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn1.html>

A critical period in the life cycle of the corn plant is the time when seeds germinate and seedlings become established. Severe infection may kill the embryo before germination. Where infection takes place after germination, seedlings may be destroyed before or after emergence. Seedlings that survive attack are usually retarded in vigor and develop into less productive plants than do plants from healthy seedlings.

Symptoms -- The symptoms of seed rot and seedling blight vary, from complete killing of the embryo before seed germination to small, discolored lesions on the roots and lower parts of the sprout. Although several fungi may parasitize the seed and seedling, symptoms are generally similar. Lesions on the mesocotyl are often brown and sunken. Discolored, water-soaked lesions indicate invasion of roots by pathogenic fungi. Aboveground symptoms appear as wilting and dying of the seedling leaves.

Optimal Environmental Conditions -- The prevalence of seedling blight varies considerably depending, in part, on weather conditions following planting. Seedling diseases are more prevalent in cold, wet soil than in warm soil. A soil temperature of about 50° F is favorable for seedling blight because, at this temperature, germination is very slow and the soilborne pathogens can grow and invade seeds and seedlings.

In addition to cold and wet soil, seed factors — age, degree of finish or maturity, mechanical damage, and genetic resistance — affect the severity of seed rot and seedling blight. Seed stored for two or more years often becomes increasingly susceptible to seed and seedling diseases when planted under unfavorable conditions. Dry seed (12% or less moisture) stored at about 35° F at low humidity will generally germinate and grow in cold soil. Immature or poorly finished seed is almost invariably susceptible to seedling blight.

Mechanical damage to the seed coat, such as breaks or cracks occurring during harvesting or processing, provides an opportunity for soilborne fungi to invade the seed.

Management: With the introduction of hybrid corn, less seed rot and seedling disease has

occurred than on open-pollinated corn. Hybrids offer better culling of seed ears, rapid artificial drying, and selection for resistance, and use of effective seed-treating materials.

Fungicides are necessary as seed treatments to manage seedling diseases. Good seed-treating materials are available that protect the seed from invasion by soilborne pathogens during the critical early stages of germination. However, these materials have little, if any effect on seed-borne pathogens already established within the seed prior to planting. With the advent of hybrid corn, the application of seed-treating material by the seed producer has become almost universal.

Another way to reduce the predisposition of seed corn to attack by pathogens after planting is to adjust harvesting and processing machinery so there is minimum physical injury to the seed coat. The use of resistant hybrids is another means of avoiding seedling diseases and insuring good corn stands. Waiting to plant until the soil has become warm and until the danger of extended periods of cold weather has passed also minimizes the hazard of poor stands due to seedling blight.

Stalk Rots and Root Rots

<http://www.ent.iastate.edu/imagegal/plantpath/corn/rotgen>

In seasons when these diseases are severe, plants may die two to three weeks before full maturity. As a result, the ears are lightweight and poorly finished. More frequently, the greatest damage is caused by stalk breakage and root lodging, which make harvesting difficult and cause many ears to fall to the ground.

Three stalks rot—diplovia, gibberella, and charcoal—show the same general type of parasitism. The causal fungi do not usually attack young physiologically active plants, but rather attack those approaching maturity. Pythium stalk rot, however, is a different type of disease because young plants may be attacked well before the silking stage.

Diplodia Stalk Rot

<http://www.ent.iastate.edu/imagegal/plantpath/corn/diplodia/0796.92diplodia.html>

Symptoms -- When infection takes place before plants reach maturity, the leaves suddenly become grayish-green, similar to the effects of frost injury; the lower parts of the stalk turn tan or brownish, and the pith becomes soft. When diseased stalks are split open, the pith is disintegrated and discolored and only the water-conducting vascular bundles remain intact. Diseased stalks are weakened and break easily in wind and rain. In the fall, minute black fruiting bodies of the fungus occasionally form just beneath the surface of the lower internodes of the stalk.

Infection takes place most frequently at the crown and spreads into the stalk and roots. Infection sometimes occurs at the nodes between the crown and the ear. Although the fungus spreads in the stalk, it does not invade the entire plant. Generally, the fungus does not grow from

the crown through the stalk and into the ear.

Optimal Environmental Conditions -- The factors affecting the prevalence of this disease are not fully known, but dry weather in the early growing season followed by ample rainfall for two to three weeks after silking appears to favor the development of this disease. Severe infection by any of the leaf diseases or destruction of leaves by hail or insects predisposes stalks to infection.

Soil fertility may affect the severity of diplodia stalk rot. Observations have shown that more stalk rot occurs where soils are excessively high in nitrogen and low in potassium than where fertility is ample and balanced.

Management-- The use of resistant hybrids is one way to reduce rot. Full-season hybrids generally are more resistant than those maturing early in a given area. Properly balanced soil fertility tends to reduce the abundance and severity of diplodia stalk rot.

When the soil is infertile, potassium-deficient or too rich in nitrogen, the disease often is severe. The application of the proper kinds and amounts of fertilizer based on soil and tissue tests may help minimize stalk rotting and breakage.

Gibberella Stalk Rot

<http://www.ent.iastate.edu/imagegal/plantpath/corn/gibberella/0796.89gstalkrot.html>

Symptoms -- Grayish-green leaves of early-infected plants resemble those of plants affected with diplodia stalk rot at the same stage of development. The softening and discoloration of lower internodes also is similar in both diseases. As the disease advances, leaves suddenly turn brown, resembling an early frost. Dark lesions appear at the nodes and extend into the internodes.

When stalks affected with gibberella stalk rot are split, they generally will show reddish discoloration of the diseased area. The shredded appearance of the pith is otherwise much the same as in diplodia stalk rots. Both stalk rots usually attack plants several weeks after silking.

Management-- This disease may be managed using full-season resistant hybrids and by adjusting soil fertility to the proper balance when necessary.

Charcoal Rot

<http://cygnus.tamu.edu/Texlab/Grains/Corn/Images/corn2.jpeg>

Symptoms -- The fungus causing this disease first attacks the roots of seedlings and young plants. Infected areas are brown and water-soaked and later become black. When the plant approaches maturity, the fungus spreads into the crown and lower internodes of the stalk.

Infected stalks may be recognized by grayish streaks on the surface of the lower internodes. Internal parts of the stalk are shredded and grayish black. Minute black specks of the fungus are scattered over the surface of the fibro-vascular bundles.

The fungus that causes charcoal rot on corn has a wide host range, attacking sorghum, beans, and several other crops.

Management-- The disease may be managed by irrigation where practical, and by long rotations with crops that are not natural hosts of the fungus. Since the disease invades the crown and stalk as the plant approaches maturity, balanced soil fertility and the use of full-season adapted hybrids probably will reduce the severity of charcoal rot.

Ear Rots

Corn is susceptible to many ear rots, five of which are widespread throughout the main corn-growing areas of the United States. Corn ear rots include diplodia ear rot, fusarium kernel rot, cob rot, gibberella rot, and gray ear rot. The diseases can, at times, reduce yield, quality, and feeding value of the grain. However, severe epidemics usually are limited to localized areas and have been of less economic importance than stalk rots.

Diplodia Ear Rot

<http://www.ent.iastate.edu/imagegal/plantpath/corn/diplodia/1355.22diplodiaearrot.html>

Symptoms -- Husks of early-infected ears appear bleached. When infection takes place within two weeks after silking, the entire ear becomes grayish brown, shrunken, and lightweight by harvest. Such ears usually remain upright, with husks stuck tightly together with fungus growing between them. Black fungal bodies are often found at the base of the husks and on the sides of the kernels.

Ears infected later in the growing season may show no external signs of the disease until the ear is broken, or until kernels are removed. White mold then will be found growing between the kernels, and their tips will be discolored. Infection usually begins at the ear base and progresses toward the tip.

Optimal Environmental Conditions -- Wet weather extending from silking until two to three weeks after silking appears to be ideal for infection of the ears, particularly if the early summer has been relatively dry.

Management-- Inbred lines vary in resistance to this ear rot and tend to transmit their reaction to their double-cross combinations. No inbred line of hybrid is completely resistant, but the most susceptible inbreeds usually are discarded before they are in hybrid combinations.

Fusarium Kernel Rot

<http://www.ent.iastate.edu/imagegal/plantpath/corn/fusarium/1355.42fusariumearrot.html>

Fusarium kernel rot probably is the most widespread disease attacking corn ears.

Symptoms -- The first symptom is a pink discoloration of the caps of individual kernels or groups of kernels scattered over the ear. The color varies from faint pink to reddish brown, depending on the moisture content of the grain. As the disease progresses, infected kernels show powdery or cottony-pink mold growth. Infection often becomes established around points where corn earworms have entered the ear or channeled between the rows of kernels.

Optimal Environmental Conditions -- The disease seems to favor dry weather. Because infections are scattered, the total loss caused by this disease is probably less than that caused by diplodia ear rot.

Management-- No specific disease management can be recommended, other than avoiding susceptible hybrids. Hybrids with poor husk cover or with weak seed coats in which kernels tend to "pop" or "silk out" are susceptible to infection.

Cob Rot

Cob rot is widely distributed and present to some extent every year.

Symptoms -- Affected ears are lightweight, and the kernels are slightly bleached, poorly finished, and easily pressed into the cob. Shanks and bases of badly infected ears often are shredded, particularly when ears are picked mechanically, or when they are shelled later. In addition, very small black spore masses are scattered in the shredded pith of the cob and on the kernel tips. The chaff on infected ears is often brown or chocolate colored instead of the normal bright red; in affected white hybrids, the chaff will be pale yellowish or gray.

Optimal Environmental Conditions -- Corn that has been killed or in which normal development has been arrested because of stalk rot, leaf blights, cold, or root injury is susceptible to cob rot. Corn grown in poor soil appears more susceptible than corn raised in fertile soil.

Management-- Since the fungus attacks ears of weakened plants, full-season adapted hybrids resistant to stalk rot and leaf blight is recommended.

Gibberella Ear Rot

<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn2.html>

Corn infected with this disease, sometimes called red ear rot, is particularly toxic to hogs.

When such corn is offered on the ear, the animals will refuse it; but when it is ground into meal, they accept it. It causes vomiting, dizziness, and, in severe cases, death. Hormonal disturbances also may occur in swine after ingestion of gibberella-infected corn.

Symptoms -- Reddish mold starting at the ear tip is the primary and distinguishing symptom of gibberella ear rot. Ears infected early may become completely rotted; the husks adhere tightly, and pinkish mold grows between them.

Optimal Environmental Conditions -- Gibberella ear rot is found frequently in cool, humid areas.

Management-- Since Gibberella ear rot generally has been a minor economic concern, no efforts have been made to manage it through breeding for resistance.

Gray Ear Rot

Symptoms -- In its early stages, this disease resembles diplodia ear rot because grayish-white mold develops on and between the kernels near the base of the ear. In ears that have been infected early, the husks are tightly adherent and bleached. At harvest, such ears are slate gray and, because of their lightweight, are held upright. When an infected ear is broken, the cob will often show small black specks scattered through it. Badly infected kernels show black streaks or specks beneath the seed coat. In advanced stages, the disease is easily distinguished from diplodia ear rot by the slate-gray color of the ear and black spots in the pith of the cob and under the seed coat.

Optimal Environmental Conditions -- The disease favors extended wet weather periods for several weeks after silking.

Management—No management for the disease is known other than the use of adapted hybrids. Since the disease is so similar to diplodia ear rot, resistance to the two diseases may be rather closely correlated.

Leaf Diseases

Leaf blights vary in prevalence and severity from year to year and from one locality to another, depending largely on environmental conditions. Humid weather or heavy dew favors the spread and development of leaf blights caused by fungi. Soil fertility does not seem to affect these diseases as much as weather conditions and the plant's genetic constitution.

Cercospora or Gray Leaf Spot

<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn1.html#corn>
<http://www.iastate.edu/imagegal/plantpath/corn/grayleafspot/0796.16graylspot.html>

This disease occurs in warm to hot humid areas of the United States. It was first reported in West Virginia in Hardy County in 1980.

Symptoms -- Lesions on maturing maize leaves are pale brown or gray to tan, long (1/4 to 2 inches), narrow and rectangular, and characteristically restricted by the veins. The lesions may coalesce, killing the leaves. The fungal disease is usually first noticed attacking the lower leaves. Extensive leaf blighting may occur until all the leaves are killed, finally resulting in stalk breakage and lodging. Total loss may occur if gray leaf spot infection occurs early and favorable environmental conditions exist following infection.

Environmental Conditions: The fungus causing this disease is most prevalent within the United States in untilled or minimally tilled fields.

Management: Hybrids differ greatly in their tolerance. Reduction in disease losses can occur by planting hybrids with partial resistance or tolerance. The use of hybrids with some resistance to gray leaf spot is important in a no-till, continuous corn production system. When corn is produced no-till for silage one year, the next year's level of disease is not as high as if corn were taken for grain. Hybrids should be planted at recommended seeding rates to promote rapid stand establishment and optimal plant development. Late planting dates increase the risk of greater gray leaf spot problems.

Northern Corn Leaf Blight

<http://cygnus.tamu.edu/Textlab/Grains/Corn/nlb.html>

Northern corn leaf blight is found in most humid areas where corn is grown. Under favorable conditions, it occasionally may become locally severe.

Symptoms: Long, elliptical, grayish-green or tan spots on the leaves, can recognize Northern corn leaf blight. When fully expanded, the spots may be 1 1/2 by 6 inches long. These lesions appear first on the lower leaves, and, as the season progresses, the number increases until under severe conditions—nearly all the leaves are covered with lesions and not much green tissue remains. Under such circumstances, the plants appear dead and gray, as though injured by frost.

In humid weather, many spores of the fungus are produced on the lower surface of the lesions. Often, the spores are arranged in concentric zones and a faint target-like pattern in the lesions is evident.

Lesions may form on husks. Since the kernels are not attacked, the possibility of distributing the disease by seed is remote.

Optimal Environmental Conditions -- The time when the disease first appears is dependent upon weather conditions. In some years, it may be found before silking; under less favorable conditions such as hot, dry weather, there may be no trace of it, however.

Reductions in grain yield may exceed 30% if the disease becomes well established two to three weeks after silking. The later the disease appears, the less the yield is reduced.

Management-- The use of resistant hybrids is the most effective and efficient means of managing northern corn leaf blight.

Southern Corn Leaf Blight

<http://cygnus.tamu.edu/Textlab/Grains/Corn/sclb.html>

<http://www.btny.purdue.edu/Extension/Pathology/CropDiseases/Corn/corn2.html#southerncornleafblight>

<http://www.ag.iastate.edu/departments/plantpath/extension/foilediseases/slb.html>

Symptoms – Leaf spots vary from elongated $\frac{3}{4}$ inch parallel sides and buff-to-brown borders to spindle shaped or elliptical yellow-green halos. Later, spots with dark, reddish-brown borders may occur on the leaves, stalks, leaf sheaths, ear husks, shanks, ears, and cobs. A black, felty mold may cover the affected kernels. Ear and cob rot can occur. Early shank invasion can cause premature death of the ear and ear drop.

Optimal Environmental Conditions -- Southern corn leaf blight, like northern corn leaf blight, is found wherever corn is grown under humid conditions. The disease thrives at slightly higher temperatures than does northern corn leaf blight. Corn hybrids with TMS cytoplasm are extremely susceptible to race "t" of the fungus, as noted in the 1970-71 epidemic occurring not only in West Virginia, but nationwide as well.

Management-- The use of resistant hybrids best manages this disease.

Helminthosporium Leaf Spot

<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn1.html>

<http://ag.iastate.edu/departments/plantpath/extension/foilediseases/hls.html>

Helminthosporium leaf spot poses a minor economic threat; it is found on a few susceptible inbred lines. Farmers are not troubled with the disease because it does not occur on commercial single - or double-cross hybrids.

Symptoms -- The fungus causes tan oval to circular spots, usually with concentric zones and measure $\frac{1}{2}$ X 1 inch. Under ideal conditions, the spots are abundant and the fungus profusely produces spores on leaf sheaths. The ears also are readily attacked, becoming chaffed with black, felty mold over the kernels.

Optimal Environmental Conditions -- The disease spreads rapidly in humid weather.

Management-- Using resistant hybrids and varieties can manage the disease. Since a single gene determines resistance, it is rather simple to incorporate resistance into a susceptible line by breeding.

Bacterial Wilt

<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn2.html#stewart'sbacterialdisease>

Bacterial wilt, sometimes referred to as Stewart's disease, is widespread over the eastern United States. It is much more severe on sweet corn than on dent corn.

Symptoms -- In sweet corn, susceptible hybrids wilt rapidly and resemble plants with an inadequate water supply. Infected plants that do not die are stunted and may not produce ears. Diseased leaves frequently show long, irregular, pale-green to yellowish streaks that later become dry and brown. The vascular bundles in the plants become filled with bacteria. When the stalks are cut, yellowish masses of bacteria ooze out of the cut surface.

In severely infected plants, cavities may form in the pith of the stalk. In such plants, bacteria spread throughout the vascular system, passing through the cob into the kernels. Infected kernels may spread the disease to new localities.

Dent corn generally is much more resistant than sweet corn; the characteristic symptoms on the leaves are long, irregular, pale green streaks that turn yellow die, and become straw-colored. This is known as the leaf-blight or the late-infection phase, since it generally becomes prevalent after tasseling. With a severe infection, much of the leaf area may be destroyed, yield is reduced and the plants become more susceptible to stalk rot. The infection of dent corn kernels is exceedingly rare and occurs only where the disease is most severe on susceptible inbred lines.

Optimal Environmental Conditions -- Bacterial wilt is carried through the winter within the bodies of corn flea beetles. When these insects come out of hibernation in late spring, they feed on young corn plants and thus start bacterial infections on the leaves.

During the growing season, the beetles continue to spread the disease from infected to healthy plants. The prevalence of bacterial wilt varies from year to year, depending on the number of infested corn flea beetles surviving the winter.

When winters are mild, large numbers of beetles survive and spread the bacterial agent during the growing season. Cold winters reduce the number of beetles and the spread of the bacterial agent is retarded.

Management-- The use of resistant hybrids is the most practical way to manage this disease. Several sweet corn hybrids have been developed, combining resistance to bacterial wilt with high yield and quality. In both sweet and dent corn, the earlier and shorter inbred lines appear more susceptible than the later and taller inbred lines. Early spraying with an insecticide to kill corn flea beetles is partly effective in reducing the spread of the disease. Adequate potassium levels in the soil seem to minimize the disease; therefore, high nitrogen levels predispose plants to susceptibility. Seed treatment or spraying plants with fungicides does not control the disease. With dent corn, there appears to be a positive correlation between resistance to the late-infection

phase of this disease and resistance to northern corn leaf blight.

Common Corn Rust

<http://www.btny.purdue.edu/extension/pathology/cropdiseases/Corn/corn2.html#commoncornrust>
<http://www.ent.iastate.edu/imagegal/plantpath/corn/comrust/0796.39maizerust.html>

Symptoms -- This rust is recognized by oval to elongate cinnamon-brown pustules (blister-like spots) scattered over both surfaces of the leaves. As corn matures, the pustules become brownish-black. The pustules may appear on any of the aboveground parts of the plant, but they are most abundant on the leaves. The pustules of this rust break through the epidermis early in their development.

Optimal Environmental Conditions -- Common corn rust often appears soon after silking, although in some years it may appear much earlier. This fungal disease favors cool, humid weather.

Management-- In the United States, there has been no urgent need to manage common corn rust. Most inbred lines are susceptible, but a few have shown resistance to one or more physiological races of this rust.

Downey Mildew or "Crazy Top"

<http://cygnus.tamu.edu/Textlab/Grains/Sweetcorn/cdm.html>
http://www.ag.ohio-state.edu/~ohioline/b827/b827_28.html

Symptoms -- This fungal disease gets its name from the partial to complete proliferation of the tassel, which is the most conspicuous symptom of this disease. Instead of developing normal floral structures, these parts continue to grow and take on the shape of small leaves, causing the tassel to become a large plummy mass. Excessive ear shoots and an increased number of internodes above the ear and in the shank characterize this disease. Severely infected plants typically have pronounced stunting; narrow, strap-like, leathery leaves; excessive tillering; and complete suppression of tassel and ear formation.

Optimal Environmental Conditions -- Flooding or soil waterlogging for 24-48 hours, shortly after planting corn, is sufficient for infection to occur.

Management-- Proper soil drainage is the most direct way to manage this disease. Seed treatment does not manage this disease.

Common Smut

<http://cygnus.tamu.edu/Textlab/Grains/Corn/cs.html>
http://www.ag.ohio-state.edu/~ohioline/b827/b827_34.html

Losses from this fungal disease, common smut, in the United States vary greatly, ranging

from a trace to about six percent in localized areas. Losses in grain yield rarely exceed 2% over wide areas. However, in sweet corn, the losses may be considerably higher. The number, size, and location of galls on the plant affect the amount of yield reduction. Large galls on and above the ear are more destructive than galls below the ear.

Symptoms -- The symptoms of common corn smut usually are conspicuous and easily recognized. All aboveground parts of the corn plant are susceptible. At first, galls are covered with a glistening white membrane. The interior of these galls soon becomes black and powdery, and the membrane ruptures to expose the sooty mass of spores. On leaves, the galls which seldom develop beyond the size of a pea—become hard and dry and contain few spores. Embryonic tissue is particularly susceptible to attack. Early infection may cause death of young plants, but this is uncommon.

Optimal Environmental Conditions -- Smut generally favors dry weather. The incidence of smut seems to be higher among plants grown in soil especially high in nitrogen and with heavy applications of barnyard manure. Dry weather or injuries from hail or cultivation increase the amount of smut by exposing tissue to invasion. Injuries resulting from detasseling in seed fields increase smut infection at the point of the stalk where the tassel is pulled out.

Management-- Avoiding extremely susceptible hybrids is the most effective means of management. Management through crop rotation and gall destruction has been recommended, but it is unlikely that such methods would be effective or even practical where corn is grown extensively. In small garden plots, the gall removal may help reduce the abundance of spores.

Maize Dwarf Mosaic Virus

<http://cygnus.tamu.edu/Textlab/Grains/Corn/mdmv.html>
http://www.ag.ohio-state.edu/~ohioline/b827/b827_29.html

Symptoms -- Symptoms first appear on the youngest leaves as an irregular, light and dark-green mottle or mosaic, which may develop into narrow streaks along the veins. As plants mature, the leaves become yellowish-green. Plants with these symptoms are sometimes stunted with excessive tillering, multiple ear shoots, and poor seed set. Early infection may predispose maize to root and stalk rots and premature death. Symptoms can appear in the field within 30 days after seedling emergence.

People, animals, machines moving through the fields, and at least 12 species of aphids, including the corn leaf aphid, the green bug, and the green peach aphid transmit the virus.

Johnsongrass is believed to be a major overwintering host for one strain of maize dwarf mosaic virus; insect carriers acquire the strain from johnsongrass in the spring and summer and infect maize plants. Another strain does not infect johnsongrass, but overwinters in other perennial susceptible grasses.

Management-- Maize varieties differ in their resistance to the virus. Varieties resistant to strain

B of the virus are also resistant to strain; however, those resistant to strain may be susceptible to strain B. Johnsongrass or other overwintering hosts should be destroyed. Maize Dwarf Mosaic

Maize Chlorotic Dwarf Virus

http://www.ag.ohio-state.edu/~ohioline/b827/b827_30.html

Symptoms--The earliest symptom caused by maize chlorotic dwarf virus is a yellowing of the young leaves in the whorl. As infected leaves unfurl, a distinct yellow striping becomes apparent. Leaf yellowing or reddening and moderate to severe stunting of internodes are common.

Maize Chlorotic Dwarf Virus is transmitted by the leafhopper *Graminella nigrifrons* and *G. (Deltocephalus) sonora*. The main overwintering host is Johnsongrass. Other hosts include broomcorn millet, milo, grain sorghum, Sudangrass, wheat, crabgrass, and foxtails.

Management—Maize varieties differ in their resistance to the virus. Johnsongrass management with herbicides is important.

Additional Reference

Shurtleff, M.C. Compendium of Corn Diseases. 1986. The American Phytopathological Society. St. Paul, Minn.

Dickson, J.G. Diseases of Field Crops. 1956. McGraw-Hill Book Company, Inc. New York.