

Insect, Nematode, and Disease Control in Michigan Field Crops

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**This bulletin contains information on the management of field crops insects, nematodes, and diseases, including recommendations for pesticide use. Every attempt is made to verify product names, formulations, use rates, and other important information, but products and labels may change before the field season begins. Always read the label of a product to reconfirm rates, precautions, PPE, and other important information before use.

CORN DISEASES

Control of foliar diseases on field corn is rarely needed. However, control of some foliar disease may be needed for the highly inbred lines used for production of hybrid seed corn. Many of the fungicide recommendations listed below are specifically for seed corn. If using these products for disease control on field corn or popcorn, make sure that they are listed on the label.

Crop rotation is one of the most important means of managing disease in corn. Rotate corn with a broadleaf crop such as dry beans, soybeans, sugar beets or potatoes. Crop rotation to broadleaf crops reduces the potential for corn leaf diseases that survive in corn debris. Small grains such as wheat, barley and oats share several serious diseases with corn. The fungus that causes Gibberella (*Fusarium graminearum*) stalk rot of corn is the same fungus that produces head scab in wheat and barley. This fungus overwinters in corn residue, and can produce high numbers of spores to infect wheat and barley. Avoid planting wheat or barley back into fields previously planted to corn. Wheat, barley and oats also share several root disease fungi in common with corn.

Northern corn leaf spot, Carbonum leaf spot

Cause: *Bipolaris zeicola* (fungus)

Symptoms: Narrow linear lesions 1/8 to 1/4 inch wide and 1/2 to 3/4 inch long appear on leaves. Lesions are grayish-tan and usually surrounded by a purplish border. The lesions usually develop between the veins of the leaf. The shape and color of the lesions may vary depending on the hybrid or variety. The leaf, leaf sheath, husks, and ears may become infected.

Disease cycle: The fungus overwinters on corn residue and kernels. It forms thick-walled resting spores (chlamydospores). Young plants become infected as they grow up through residues of the previous corn crop. During prolonged damp weather, infected leaves produce more spores which may be wind blown over long distances to other cornfields to spread the disease

Conditions favoring the disease: The disease is favored by moderate temperatures (65°-80°F) and high relative humidity during the growing season. Dry weather slows spread of the disease. Using minimum tillage and growing continuous corn also favor the disease.

Management: Many hybrids are resistant. There are five distinct races of this fungus; race 3 causes northern corn leaf spot.

Disease is primarily a problem in seed production fields planted with highly susceptible inbreds. Rotate away from corn for 1-2 years; till fields deeply in fall to bury infected crop residue. Foliar fungicides may be useful in seed production fields.

Check the label for additional information including re-entry intervals (REI), pre-harvest intervals (PHI), and plant-back restrictions.

List of registered fungicides (rate per acre or as noted):

Bumper 41.8 EC 2-4 fl. oz.

Chlorothalonil 720 0.75-2.0 pints

Dithane DF Rainshield 1.5 lb.

Dithane F45 1.2 quarts

Dithane M45 1.5 lbs.

Echo 720 1.5 – 2 pints

Echo 90 DF 1 1/4- 1 5/8 lb.

Echo Zn 1 1/8- 2 3/4 pints

Equus 500 Zn 1.1-2.8 pints

Manzate Flowable 1.2 quarts

Manzate Pro-stick 1.5 lbs.

Penncozeb 75 DF 1.0-1.5 lb.

Penncozeb 4FL 0.8-1.2 quarts

Penncozeb 80 WP 1-1.5 lb

Propimax EC 2-4 fl. oz.

Quadris Flowable 9.2-15.4 fl. oz.

Tilt EC 2-4 fl. oz.

Common corn rust

Cause: *Puccinia sorghi* (fungus)

Symptoms: The first symptoms appear as chlorotic flecks on the upper and lower surfaces of the leaves. The flecks become oval to elongate reddish-brown pustules containing reddish-orange spores. Severely infected corn leaves and leaf sheaths turn chlorotic and die. As the pustules mature, they become brownish black, and produce a different type of spore (teliospores) that only infects oxalis. However, in cooler areas of the country like Michigan, oxalis does not become infected.

Disease cycle: The fungus spreads by airborne spores traveling up on wind currents and storms from the South. This fungus does not survive winter in Michigan. Symptoms usually appear soon after silking. Once the pustules begin to produce the reddish-orange spores (called uredospores), repeating cycles of infection can take place, spreading the disease. New infections can occur about every 7-14 days.

Conditions favoring the disease: Cool temperatures (61 to 77°F) and high humidity (greater than 95%), especially for extended periods of time.

Management: Rust is usually not a serious disease in hybrids. Monitor fields weekly for signs of disease. For susceptible inbreds, apply a registered fungicide soon after symptoms appear. Check the label for additional information including re-entry intervals (REI), pre-harvest intervals (PHI), and plant-back restrictions.

List of registered fungicides (rate per acre or as noted):

Bravo Ultrex 0.7-1.8 lbs.
Bumper 41.8 EC 4 fl. oz.
Dithane DF Rainshield 1.5 lb.
Dithane F45 1.2 quarts
Dithane M45 1.5 lbs.
Echo 720 1.5 – 2 pints
Echo 90 DF 1 1/4- 1 5/8 lb.
Echo Zn 1 1/8- 2 3/4 pints
Equus 500 Zn 1.1-2.8 pints
Manzate Flowable 1.2 quarts
Manzate Flowable 1.2 quarts

Manzate Pro-stick 1.5 lbs.
Penncozeb 75 DF 1.0-1.5 lb.
Penncozeb 4FL 0.8-1.2 quarts
Penncozeb 80 WP 1-1.5 lb
Propimax EC 4 fl. oz.
Quadris Flowable 6.2-9.2 fl. oz.
Serenade WP 1-3 lb. (biofungicide)
Sonata 2-4 quarts (biofungicide)
Stratego EC 7-10 fl. oz.
Tilt EC 4 fl. oz.

Gray leaf spot

Cause: *Cercospora zae-maydis* (fungus)

Symptoms: Early foliar symptoms are yellow to tan lesions with a faint watery halo which can be seen when held up to the light. Older lesions are tan to brown in color and bordered by the veins of the leaf; several lesions may run together. Individual lesions are about 3” to 4” long and 1/16” to 1/8” inch wide. Lesions which are orange to yellow in color (instead of tan) are produced on some hybrids. Lesions may occur on the leaf sheath and stalk of some hybrids.

Disease cycle: The fungus overwinters in and on corn debris in the field and on the soil surface. In late spring when weather is warm and humid, spores develop on the corn residue, and are spread by wind to the lower leaves of the current season’s corn crop. Infections may begin to develop in early summer, and spread rapidly with favorable weather conditions in mid to late summer.

Conditions favoring the disease: High humidity, and poor air circulation create favorable conditions for infection, which requires leaf surfaces to be wet for 11 to 13 hours and relative humidity at or above 90% for 12 to 13 hours. Continuous corn and reduced tillage allow the fungus to build up in the field.

Management: Use resistant hybrids. Rotate away from corn for two years with reduced tillage or one year with conventional tillage. In fields with a history of this disease, begin scouting for the disease at the V10-V14 growth stage. Fungicides need to be applied before significant injury has taken place if they are to be effective. Check product labels for additional information.

List of registered fungicides (rate per acre or as noted):

Bumper 41.8 EC 4 fl. oz.
Echo Zn 1 1/8- 2 3/4 pints
Manzate Flowable 1.2 quarts
Manzate Pro-stick 1.5 lbs.
Penncozeb 75 DF 1.0-1.5 lb.
Penncozeb 4FL 0.8-1.2 quarts

Penncozeb 80 WP 1-1.5 lb
Propimax EC 4 fl. oz.
Quadris Flowable 9.2-15.4 fl. oz.
Stratego EC 10-12 fl. oz.
Tilt EC 4 fl. oz.

Northern corn leaf blight

Cause: *Exserohilum turcicum*, (formerly *Helminthosporium turcicum*) (fungus)

Symptoms: Cigar-shaped, gray-green to tan lesions (1"-6" long) develop first on older lower leaves. Symptoms progress up the plant and resemble frost or drought injury. Lesions form on husks but ears are not infected.

Disease cycle: The fungus overwinters on leaves, husks, and other crop debris as thick walled resting spores (chlamydospores). In early summer during wet weather, spores are produced on the corn residue and travel in wind and rain to infect the lower leaves of young plants. Lesions develop within 7-12 days. Spores produced on infected leaves can be wind-blown long distances. Secondary spread can occur within and between fields.

Conditions favoring the disease: Infection occurs when free water is present on the leaf surface for 6-18 hours with temperatures between 66 and 80°F Moderate temperatures, heavy dews, and frequent showers are favorable. High losses can occur if infection takes place before tasselling.

Management: Use resistant hybrids. When growing susceptible hybrids, use a one- to two-year rotation away from corn. Destroy old corn residues by tilling. If applying fungicides, begin applications when lesions first appear on the leaf below the ear.

Check the label for additional information including re-entry intervals (REI) pre-harvest intervals (PHI), and plant-back restrictions.

List of registered fungicides (rate per acre or as noted):

Bravo Ultrex 0.7-1.8 lbs.

Bumper 41.8 EC 2-4 fl. oz.

Dithane F45 1.2 quarts

Dithane M45 1.5 lbs.

Echo 720 1.5 – 2 pints

Echo 90 DF 1 1/4- 1 5/8 lb.

Echo Zn 1 1/8- 2 3/4 pints

Equus 500 Zn 1.1-2.8 pints

Manzate Flowable 1.2 quarts

Penncozeb 75 DF 1.0-1.5 lb.

Penncozeb 4FL 0.8-1.2 quarts

Penncozeb 80 WP 1-1.5 lb.

Propimax EC 2-4 fl. oz.

Quadris Flowable 9.2-15.4 fl. oz.

Tilt EC 2-4 fl. oz.