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Wheat Diseases

Michigan State University Extension Service

Joseph L. Clayton, L. Patrick Hart, Botany and Plant Pathology

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# Wheat Diseases

Joseph L. Clayton, Dennis W. Fulbright and L. Patrick Hart  
Dept. of Botany and Plant Pathology

This bulletin provides useful information for diagnosing crop diseases in the field and the plant clinic laboratory. It will assist crop disease consultants and their scouts, state agricultural advisers, agribusiness representatives, pest control dealers and applicators, county agricultural agents, students in plant sciences and growers throughout Michigan.

The descriptions of symptoms, environmental conditions favoring disease, method of transmission and recommended control are brief, but complete. The calendar indicates the month in

which symptoms appear and the plant part showing the symptom. More detailed information, including photos of disease symptoms, is available in the wheat disease compendium and in Extension bulletins. Contact your county Cooperative Extension Service office or the MSU Bulletin Office to obtain these publications.

For information on resistant hybrids and varieties, chemical control and other measures, consult recent literature, competent area specialists, Extension plant pathologists or informed seed suppliers.

## WHEAT DISEASES

DISEASE	MONTH SYMPTOMS APPEAR							PLANT PART SHOWING SYMPTOMS				
	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	ROOTS	LEAVES	STEMS	HEAD	ENTIRE PLANT
Bacterial Mosaic			•						•			
Bacterial Leaf Blight		•							•			
Ergot			•	•							•	
Scab			•	•							•	
Loose Smut			•	•							•	
Common Bunt			•	•	•						•	
Dwarf Bunt			•	•	•						•	
C-Stripe		•	•	•					•			•
Powdery Mildew	•	•	•			•	•		•		•	
Leaf Rust		•	•	•		•	•		•			
Stem Rust			•	•	•				•	•		
Tan Spot			•						•			
Septoria Leaf Spot	•	•	•						•			
Glume Blotch		•	•	•	•				•	•	•	•
Eye Spot or Strawbreaker			•	•						•		•
Sharp Eye Spot		•	•							•		•
Take-All		•	•	•				•		•	•	•
Pythium Root Rot	•					•	•	•	•			•
Crown and Root Rot, Seedling Blight	•					•	•	•	•			•
BYDV	•	•	•	•		•	•		•		•	•
WSMV			•	•					•		•	•
WSSMV	•	•	•						•			
Magnesium Deficiency		•	•						•			•
Manganese Deficiency		•	•						•			•

## WHEAT DISEASES

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Bacterial Mosaic* ( <i>Clavibacter michiganense</i> subsp. <i>Tesellarium</i> )	Small yellow spots and mottling near the mid-rib coalesce into streaks, turning leaf tissues tan to dark brown.	Warm, moist weather.	Thought to be seed-borne; survives on crop residue; spread by hail, splashing rain and blowing soil particles.	Plant clean certified seed; rotate crops.	
Bacterial Leaf Blight* ( <i>Pseudomonas syringae</i> )	Water-soaked spots on upper leaves become necrotic—gray-green to tan-white and coalesce into irregular streaks covering the entire leaf.	Cool, wet weather (59° to 77°F).	Common in soil and water. Bacteria are spread by wind-driven rain; enter by stomates and wounds; can be seed-borne.	Plant clean, certified seed; rotate crops away from corn and sorghum.	Also affects corn and sorghum.
Ergot ( <i>Claviceps purpurea</i> )	Purple-black, horn-like sclerotia replaces seeds in the head.	Cool, wet weather.	Spores live in soil for 1 year, germinate in the spring, and spread to heads during flowering by wind.	Mow grasses in roadsides adjacent to small grain fields before heading. Clean seed; plow deeply.	
Scab or Head Blight ( <i>Fusarium</i> spp., <i>Gibberella zeae</i> )	Blighted or bleached spikelets occur after flowering; orange or pink mycelium and spore masses appear at the base of diseased spikelets; bleached spikelets are sterile or contain shriveled seed.	Hot, humid weather during flowering and grain ripening.	Pathogen survives on infected corn and grass residues on the soil; infection occurs from wind-borne spores.	Rotate crops to other than wheat, corn, barley, oats, or rye; clean plow.	Scabby wheat may be toxic to nonruminant animals.
Loose Smut ( <i>Ustilago tritici</i> )	Black smutty spore masses replace both grain and chaff; smutted heads emerge earlier from the boot than healthy ones.	Cool, cloudy, wet weather at flowering.	Wind carries smut spores to healthy plants at flowering; spores germinate and infect developing grain; smut fungus is carried internally within seed to the next crop.	Plant certified seed treated with <i>Carboxin-Vitavax</i> .	

\*only occasionally a problem in Michigan.

## WHEAT DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Common Bunt or Stinking Smut ( <i>Tilletia caries</i> , <i>Tilletia foetida</i> )	Grain is replaced by black powdery spore mass; smut balls give off a fishy odor.	Cool, moist weather at seed germination.	Smut balls break during threshing and spores collect on seeds and in soil; spores germinate and infect young seedlings following planting.	Treat seed with <i>Carboxin-Vitavax</i> .	
Dwarf Bunt ( <i>Tilletia controversa</i> )	Same as for common bunt, except plants may be very stunted or dwarfed.	Extended periods of heavy snow cover and soil temperatures near freezing to 40°F.	Spores germinate over several months. Teliospores can survive for long periods in soil.	Use resistant variety if available. Seed treatment is not effective. Use disease-free seed.	
C-Stripe ( <i>Cephalosporium gramineum</i> )	During joint and heading, plants show long, yellow stripes along the mid-vein; stripes later become tan to brown; plants become stunted and ripen prematurely.	Wet acid soils, fluctuating winter temperatures and wheat on wheat.	Pathogen is soil-borne; enters root wounds caused by insects, soil heaving and other stresses.	Use a 2- to 3-year rotation program with spring grains or forages. Deep plow stubble; plant after fly-free date.	
Powdery Mildew ( <i>Erysiphe graminis tritici</i> )	Patches of white to dull gray-brown mycelium appear on leaf surface; colonies of sexual fruiting bodies (cleistothecia) appear; mature cleistothecia are brown-black dots.	Cool temperatures (65° to 75°F), high humidity (80 to 95%) and low light.	Overwinters as cleistothecia on straw; wind-borne conidia are primary inoculum; new infection occurs within 7 to 10 days.	Rotate crops and plant resistant varieties.	
Leaf Rust ( <i>Puccinia recondita tritici</i> )	Small, round or oval, raised orange-red pustules appear on leaf surface.	Cool nights; warm, bright days and 6 to 8 hours of free moisture on the leaves.	The orange spores are wind-borne and new infections occur every 10 to 12 days.	Plant resistant varieties.	
Stem Rust ( <i>Puccinia graminis tritici</i> )	Elongated, ragged, brick-red pustules appear on the stem and leaves.	Cool nights; warm, bright days and free moisture on stems and leaves for 6 to 8 hours.	The brick-red spores are wind-borne and new infections occur every 14 days.		Not a serious problem on Michigan winter wheat.

## WHEAT DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Yellow Leaf Spot or Tan Spot ( <i>Pyrenophora trichostoma</i> )	Tan-brown flecks expand into large oval- shaped blotches with yellow borders; leaves die from tip toward base.	Cool, wet weather.	Pathogen overwinters in wheat stubble as small, raised black perithecia; infection needs a 6 to 48 hour wet period to occur. All new infections are wind-borne ascospores.	Manage stubble and rotate away from wheat, barley, rye and oats for 2 years.	
Septoria Leaf Spot ( <i>Septoria tritici</i> )	Irregular, reddish- brown spots occur, often with ashen white centers studded with tiny, black pimples (pycnidia); abundant on lower leaves.	Cool, wet weather.	Fungus survives as mycelium in leaf tissue of living plants. Over- winters as pycnidia on stubble. New spores are wind-borne in the spring.	Sanitation; plow stub- ble under; rotate at least one year between wheat crops. Delay planting until 10 days after fly free date.	
Glume Blotch ( <i>Septoria nodorum</i> )	Small, purplish-gray spots appear on glumes with pycnidia; light brown spots with dark brown margins occur on leaves.	Warm, wet weather (optimal is 68° to 80°F).	Pathogen is seed- borne; survives as mycelium in living plants and as pycnidia on stubble. Conidia are produced during wet periods and wind- blown to leaves, stems and heads.	Manage stubble where feasible and rotate crops.	
Eye Spot or Strawbreaker ( <i>Pseudocercospora herpotrichoides</i> )	Elliptical or eye-shaped lesions appear just above soil level. The lesions are distinct, gray to tan-brown and oriented longitudinally with the stem.	High moisture, dense crop canopy and high humidity near the soil surface. Mild winters and cool springs pro- long sporulation and infection periods.	The fungus survives as mycelium on host debris. Conidia are dis- tributed principally by splashing rain with a dispersal radius of 1 to 2 meters.	Delay planting until 10 days after fly free date; reduce nitrogen and rotate crops 2 years away from cereals.	

## WHEAT DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Sharp Eye Spot ( <i>Rhizoctonia solani</i> )	Necrotic spots appear on lower stems resembling eyespots with light gray centers; distinct black-brown edging and dark brown sclerotia are often evident. Lesions are located just above the first node. Sometimes, 2 or 3 eye-shaped lesions occur.	Cool, dry weather; dry acid and sandy soils increase risk.	The pathogen survives as small brown-black sclerotia in soil and as mycelium in debris of many kinds of plants.	Plant seed late and shallow; promote root growth with fertilizer.	
Take-All ( <i>Gaeumannomyces graminis</i> )	Plants are stunted, sparse tillering, bleached yellow. Heads become ashen white; base of stem turns brown to black, with a dark brown to black layer of fungus mycelium between stem and leaf sheath; roots rot; diseased plants usually occur in circular patches in the field.	Wet spring weather, poor soil conditions and use of high nitrate fertilizers.	Soil-borne; spread from plant to plant via runner hyphae advancing through soil and across root bridges.	Rotate crops with legumes and use a balanced soil fertility program; control quack and other wild grasses that serve as hosts.	
Pythium Root Rot ( <i>Pythium</i> spp.)	Pale green, mildly stunted plants; soft, wet, tan-brown areas at root tips.	Cool, wet soils deficient in phosphorus.	Soil-borne; enters roots through direct penetration or wounds; mycelium invades young cells causing rapid root death.	Provide good soil drainage and good air circulation among plants; plant when temperatures favor fast growth; avoid high nitrate fertilizers.	
Crown and Root Rot, Seedling Blight ( <i>Helminthosporium</i> spp., <i>Fusarium</i> spp.)	Leaves yellow, roots and crowns rot; crowns are brown-black; plants die or become badly stunted.	Drought and warm temperatures are the most important factors; dry falls and open winters.	Fungi survive in the soil.	Treat seed, eradicate all wild grasses, delay planting until 10 days after fly free date; plant into a firm, shallow seedbed.	

## WHEAT DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Barley Yellow Dwarf Virus (BYDV)	Leaves turn yellow or bright red starting at the leaf tip and running to the base. Stunting, no mottling.	Moderate temperatures favor foliar symptoms.	Virus transmitted by aphids only. The four most common are: The Green Bug, Corn Leaf, English Grain, and Oat Bird-Cherry.	Avoid planting early in fields that were planted to oats; delay planting until 10 days or more after fly free date.	All cereals and wild grasses are hosts.
Wheat Streak Mosaic Virus (WSMV)	Leaves develop yellowish-green streaks and mottling; streaks are parallel and discontinuous; plants are stunted with sterile heads; many leaves become yellow and necrotic.	Warm, dry weather.	The wheat curl mite ( <i>Aceria tulipae</i> ) is the sole carrier of WSMV. The virus is carried in the mid- and hind-gut of the larvae and adult mites. Can be transmitted mechanically.	Clean plow; delay planting until 10 days after fly free date.	All cereal crops and most wild grasses are host.
Wheat Spindle Streak Mosaic Virus (WSSMV)	Older leaves are a bright yellow-green with mottling; younger leaves show light green or yellow streaks and dashes; streaks and dashes are orientated parallel with leaf veins and taper at both ends to form spindles.	Cold air temperatures (40° to 55°F).	WSSMV is transmitted by a soil-borne fungus ( <i>Polymyxa graminis</i> ) that invades wheat roots in the fall.	Rotate crops and delay planting until 10 days after fly free date.	The virus lives in the soil for 8 years or more.



## WHEAT DISEASES *Continued*

DISEASE	SYMPTOMS	ENVIRONMENTAL CONDITIONS FAVORING DISEASE	METHOD OF TRANSMISSION	RECOMMENDED CONTROL	SPECIAL NOTES
Magnesium (Mg) Deficiency	Pale green, stunted plants with necrotic areas near leaf margins.	Deficiencies occur on high acid soils.	Nonparasitic.	Apply as a foliar spray: 10 to 20 lb Epsom salts in 30 gal. water per acre. Apply when plant stress is low—in early morning or evening.	
"Gray Speck" Manganese (Mn) Deficiency	Gray-white spots appear on all young leaves accompanied by chlorotic or gray-white streaks; leaves kink or droop at the base. Plants are slow to mature.	Mn is unavailable in highly alkaline, calcareous soils when pH exceeds 6.0.	Nonparasitic.	Apply as a foliar spray: 1 lb/A Mn on small plants and 2 lb/A on larger plants.	Occurs mainly in the southeastern and northeastern parts of the lower peninsula.

See also the wheat compendium and Extension bulletins E-808, *Wheat Spindle Streak Mosaic Virus*, E-1178, *Common Bunt: Again a Threat to Wheat*, E-1420, *Wheat Diseases I*, and E-1421, *Wheat Diseases II*.

\*NOTE: The severity of most wheat diseases in Michigan is reduced when planting is delayed until 10 days past the Hessian fly free date.

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