

Wheat and Oat

Weed, Insect and Disease Field Guide



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WEEDS



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Annual bluegrass

Latin name: *Poa annua*

General information: Prolific weed with typical emergence from September through March. For best management in wheat, scout for annual bluegrass from September through February. Annual bluegrass can be controlled with herbicides in wheat. Optimum timing of herbicide application for annual bluegrass control in wheat is in the fall and/or early spring.



Flowering bluegrass plant

Identifying characteristics: Fibrous root system; erect or bending stems often rooting at lower nodes. Leaves are 0.5-5 inches long, no pubescence and bright green, with white panicle inflorescences.



Bluegrass seedling

Burclover

Latin name: *Medicago polymorpha*

General information:

Prolific weed with typical emergence from October through March. For best management in wheat, scout for burclover from September through January. Burclover can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for burclover control in wheat is in fall and early spring.

Identifying characteristics:

Fibrous roots from taproot; erect stems; leaves alternate and palmately trifoliate with three or less leaflets. Flowers are yellow.



Mature burclover plant



Burclover flower



Purple spot on burclover leaflets

Carolina geranium

Latin name: *Geranium carolinianum*

General information: Typical emergence from October through March. For best management in wheat, scout for Carolina geranium from September through January. Carolina geranium can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for Carolina geranium control in wheat is in fall and early spring.



Mature leaf Carolina geranium

Identifying characteristics: Fibrous root system from shallow taproot; stems are erect, freely branching near base and densely pubescent; leaves are deeply cut into five to nine finger-like lobed segments, pubescent on both sides of the leaf. Flowers are whitish-pink to pale purple.



Carolina geranium Mature plant

Cheat

Latin name: *Bromus secalinus*

General information: Typical emergence from October through March. For best management in wheat, scout for cheat from October through March. Cheat can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for cheat control in wheat is in fall and early spring

Identifying characteristics: Fibrous root system; stems erect but often bend and root at lower nodes; leaves up to 12 inches long and pubescent on both surfaces. Sheaths are pubescent. Inflorescence is an open panicle with thin branches. Green at maturity.



Cheat seedhead

Curly dock

Latin name: *Rumex crispus*

General information:

Typical emergence from September through May. For best management in wheat, scout for curly dock from October through March. Curly dock can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for curly dock control in wheat is in fall and spring.



Rosette growth stage of Curly dock

Identifying characteristics: Roots are fibrous with fleshy taproot; stems are erect, 1.5 to 5 feet long, coarse, thick and not branched; leaves are alternate with no pubescence and leaf margins are crimped and dark green. Inflorescence is a terminal panicle, 6-24 inches long with no petals.



Seedling curly dock

Cutleaf evening-promise

Latin name: *Oenothera laciniata*

General information: Typical emergence from October through March. For best management in wheat, scout for cutleaf evening-primrose from October through February. Cutleaf evening-primrose can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for cutleaf evening-primrose control in wheat is in late-fall and very early spring.



Cutleaf evening-promise plant in rosette growth stage

Identifying characteristics: Erect, prostrate or ascending growth; cotyledons are kidney-shaped with petioles flat on upper surface and are not seen after second leaf develops; stems are simple or many-branched from base, pubescent; leaves are alternate, leaf margins coarsely toothed to lobed, dull green in color, smooth or pubescent. Inflorescence is single flower in leaf axis, yellow to reddish in color. Fruits are capsules and shaped like a cigar.



Close up of apical bud



Fruiting structure

Hairy buttercup

Latin name: *Ranunculus sardous*

General information: Typical emergence from September through May. For best management in wheat, scout for hairy buttercup from October through January. Hairy buttercup can be controlled with herbicides in wheat. Optimum timing of herbicide application for hairy buttercup control in wheat is in fall or spring.



Hairy buttercup flower

Identifying characteristics: Cotyledons are oblong with rounded tips; stems are erect, single or branching from base, green and very pubescent; leaves in a basal rosette pattern, alternating upward, palmately three-lobed, pubescent; inflorescence is single flower, pale to bright yellow and showy.



Seedling plant of hairy buttercup

Henbit

Latin name:

Lamium amplexicaule

General information: Prolific weed with typical emergence from September through May. For best management in wheat, scout for henbit from September through January. Henbit can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for henbit control in wheat is in the fall.

Identifying characteristics: Fibrous root system from taproot; stems are square, green to purple-tinged, with numerous branches, pubescent; leaves are opposite, triangular or circular, leaf margins with rounded teeth, dark green to light green. Flowers are red-dish purple.



Henbit seedling



Close-up of henbit flower



Field covered with henbit in winter

Horseweed

Latin name: *Conyza canadensis*

General information:

Typical emergence from October through May. For best management in wheat, scout for horseweed from October through April. Horseweed can be controlled with certain herbicides in wheat. Optimum timing of herbicide application for horseweed control in wheat is in late fall and very early spring.



Horseweed at rosette growth stage

Identifying characteristics: Cotyledons are green, without evident veins, smooth; stems are erect, 3-7 feet tall, rough to touch; leaves begin as basal rosette and alternate after, simple with entire or toothed margins, pubescent; inflorescences are numerous small heads arranged on elongated panicles, small white to lavender flowers. Taxonomy can be highly variable.



Bolting plant in soybean field

Italian ryegrass

Latin name:

Lolium perenne spp. *multiflorum*

General information: Prolific weed with typical emergence from October through May. For best management in wheat, scout for Italian ryegrass from September through April. Italian ryegrass can be controlled with herbicides in wheat; however, resistance to many herbicides has been documented in Italian ryegrass. Optimum timing of herbicide application for Italian ryegrass control in wheat is in the fall and spring.

Identifying characteristics: Fibrous root system; erect stems that branch at base; leaves are 2-14 inches long; inflorescences are slender spikes. Leaves typically have a shiny to waxy green color.



Italian ryegrass seedling



Inflorescence of ryegrass



Ryegrass before seedhead emergence

Lesser swinecress

Latin name: *Coronopus didymus*



Lesser swinecress leaves

General information: Prolific weed with typical emergence from November through April. For best management in wheat, scout for lesser swinecress from November through February. Lesser swinecress can be controlled with herbicides in wheat. Optimum timing of herbicide application for lesser swinecress control in wheat is in the fall or spring.

Identifying characteristics: Cotyledons are smooth and club-shaped; stems are prostrate, spreading or ascending, multibranched, smooth or pubescent, with pungent odor; leaves begin in a basal rosette then alternate upward with margins smooth or toothed; fruit is clublike, with seeds in two rows.



Mature plant with fruiting structures

Little barley

Latin name: *Hordeum pusillum*

General information: Prolific weed with typical emergence from October through April. For best management in wheat, scout for little barley from October through March. Little barley can be controlled or suppressed with some herbicides in wheat. Optimum timing of herbicide application for little barley control in wheat is in the fall.

Identifying characteristics: Thin, erect stem with smooth or pubescent leaf sheaths and blades; narrow, dense inflorescence densely covered with awns.



Seedhead and flag leaf



Seedhead with awns

Shepherd's-purse

Latin name: *Capsella bursa-pastoris*

General information: Prolific weed with typical emergence from October through April. For best management in wheat, scout for shepherd's-purse from November through April. Shepherd's-purse can be controlled with herbicides in wheat. Optimum timing of herbicide application for shepherd's-purse control in wheat is in the fall and spring.

Identifying characteristics: Erect, unbranched or branched and covered with grayish pubescence; leaves in basal rosette, alternate and smaller leaves; fruits are triangular or heart-shaped.



Fruiting structures and flowers of Shepherd's-purse



Mature Shepherd's-purse plant

Smallflowered bittercress

Latin name: *Cardamine parviflora*

General information: Prolific weed with typical emergence from November through April. For best management in wheat, scout for smallflowered bittercress from November through April. Smallflowered bittercress can be controlled with herbicides in wheat. Optimum timing of herbicide application for smallflowered bittercress control in wheat is in the fall or spring.

Identifying characteristics: Erect stem, with basal leaves in rosette; leaves alternate and pinnately dissected; smooth petioles; flowers with four small white petals.



Mature plant Smallflowered bittercress

Sowthistle

Latin name: *Sonchus* spp.

General information: Prolific weed with typical emergence from September through May. For best management in wheat, scout for sowthistle from November through May. Sowthistle can be controlled with herbicides in wheat. Optimum timing of herbicide application for sowthistle control in wheat is in the fall and spring.



Sowthistle flower

Identifying characteristics:

Erect plant; stems hollow, with milky sap; leaves alternate, deeply lobed, with prickly spines along leaf margins; flowers bright yellow; fruits have tufts of long trichomes.



Seedling sowthistle plant



Prickly spines on leaves

White clover

Latin name: *Trifolium repens*

General information: Prolific weed with typical emergence from September through May. For best management in wheat, scout for white clover from October through April. White clover can be controlled with herbicides in wheat. Optimum timing of herbicide application for white clover control in wheat is in the fall and/or spring.



Mature clover plant with flower

Identifying characteristics: Erect or ascending perennial that can propagate via stolons; leaves and flowering stems arise from stolons; leaves are palmately compound, with small-toothed leaflets that can have white color mixed with green in upside-down V shape; flower round and white.



Mature white clover plant with white upside-down V shape

Wild garlic

Latin name: *Allium vineale*

General information: Prolific weed with typical emergence from November through April. For best management in wheat, scout for wild garlic from November through April. Wild garlic can be controlled with herbicides in wheat. Optimum timing of herbicide application for wild garlic control in wheat is in the fall and spring.



Single wild garlic plant

Identifying characteristics:

Erect plant; aerial and underground bulbets; leaves round, hollow, with distinctive odor; and inflorescence is greenish-white and small on short stems above aerial bulbets.



Mature wild garlic plant

Wild onion

Latin name: *Allium canadense*

General information: Prolific weed with typical emergence from November through April. For best management in wheat, scout for wild onion from November through April. Wild onion can be controlled with some herbicides in wheat. Optimum timing of herbicide application for wild onion control or suppression in wheat is in the fall and spring.

Identifying characteristics: Erect plant; underground bulb with a veined outer coat; leaves are flat with slight keel and not hollow, with distinctive onion odor.



Juvenile wild onion plant



Underground bulbs from wild onion

INSECTS



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Aphids

Latin name: Greenbug, *Schizaphis graminum*; Bird cherry-oat aphid, *Rhopalosiphum padi*; Corn leaf aphid, *Rhopalosiphum maidis*

When to scout: A complex of greenbug aphids, bird cherry-oat aphids, and corn leaf aphids can affect Louisiana wheat. Greenbug is by far the most damaging species. For greenbug, count the number of aphids in 1 row-foot at multiple sites in each field. Treat when populations reach 100-300 aphids per row-foot when plants are 3-6 inches high, 200-400 aphids at 4-8 inches high and 300-800 aphids at 6-19 inches high. Other aphid species may require treatment to prevent transmission of barley yellow dwarf virus.

Damage: Greenbug injures wheat by injecting a toxin into the plant, which results in yellowing, necrosis and death. Other aphids may stress wheat, particularly under dry conditions, but otherwise cause little direct damage. More important damage is caused by the aphid-transmitted disease, the barley yellow dwarf virus. The infested plants often become severely stunted and produce heads of reduced size.

Characteristics: All aphids affecting Louisiana wheat are similar in size and shape. They typically are about the size of a BB and pear shaped. Greenbug has a yellow-green head and upper thorax with a light to medium green abdomen. Bird cherry-oat aphid is brownish olive green with a darker reddish-orange spot toward the tip of the abdomen. Corn leaf aphid is dark olive to bluish green with a purplish area around its cornicles.



Greenbugs



Bird cherry-oat aphid



Corn leaf aphid

Armyworms

Latin name: Fall armyworm, *Spodoptera frugiperda* (J.E. Smith); True armyworm, *Pseudaletia unipuncta* (Haworth)

When to scout: Fall armyworms occasionally infest wheat during the fall, whereas true armyworms are most notable during the spring. Early planted wheat in particular, should be scouted for fall armyworms. Flocks of birds settling in young wheat often are indicative of an infestation. Wheat fields should be closely scouted for true armyworms prior to booting. True armyworms are night feeders and may hide under debris during the day. Treat armyworm infestations when five or more worms per square foot are found and foliage loss is evident. Pay particular attention to preventing the loss of flag leaves prior to heading.

Damage: Armyworms chew irregularly shaped hole in leaves, giving them a ragged appearance. Armyworms generally feed on lower leaves first and may eventually consume flag leaves or cut heads off.

Characteristics: Fall armyworms usually are greenish-brown or tan with the back marked by three longitudinal stripes. The most distinct characteristic is the prominent white inverted "Y" on the front of the head. True armyworms are brown to black in color and have an orange, white and brown stripe running the length of the body.



Armyworm on wheat



True armyworm



Fall armyworm

Cereal leaf beetle

Latin name: *Oulema melanopus* (L.)

When to scout: Cereal leaf beetle is seldom a significant pest of wheat in Louisiana. Beetles are active in the spring and should be scouted for beginning in March, although larvae do not appear until near heading. Scout by counting the number of adults and larvae from at least 10 stems per sample location. Check several locations within each field. Treatment should be considered if numbers exceed 25 per 100 stems.



Cereal beetle larva

Damage: Both adults and larvae will feed on leaves, but the larvae cause much more injury. Injury appears as skeletonized long strips where the leaf tissue has been consumed between the veins.

Characteristics: The cereal leaf beetle is a small beetle with a bluish-black head and abdomen and orange-red thorax. The larvae are pale orange grubs with brown to black heads and legs. The grubs usually are covered with shiny black mucous mixed with feces, which obscures their appearance.

Hessian fly

Latin name: *Mayetiola destructor* (Say)

When to scout: Visual detection of adult Hessian flies in the field may justify a foliar insecticide application. Once the larvae move into the base of the stem, rescue treatments are ineffective. To determine the need for preventive measure in future plantings, check for larvae and “flaxseed” pupae from 10 plants at each sample site in early spring. Multiple sample sites may be needed. Planting Hessian fly-resistant varieties is the most effective means of managing this pest.



Hessian fly larvae



Hessian fly larvae and pupae

Damage: Larvae feed on the stem at the joints under the leaf sheath. Stunted stems may lead to plant lodging, grain fill reduction and even death, especially in early plant stages. Reductions in yield usually occur when larvae or pupae are detected in at least 8 percent of tiller in the fall or 15 percent of stems in the spring.

Characteristics: Adults are small, dark, long-legged flies that resemble mosquitoes. Eggs are reddish and single or connected as “egg-line” on the upper leaf surface. Newly hatched larvae are orange; a few days later they become white. Pupae are brown, like flaxseeds.

Stink bugs

Latin name: Rice stink bug, *Oebalus pugnax* (F.);
Brown stink bug, *Euschistus servus* (Say)

When to scout: Stink bugs infest wheat after heading. Begin to scout when the crop is at the milk stage. Scout away from field edges, where stink bugs are more abundant. Treat when 10 percent of spikes (wheat heads) in the milk stage are infested or 25 percent of spikes in the soft dough stage are infested.

Damage: Stink bugs feed on developing seeds. Wheat is susceptible to stink bug injury during the milk and soft dough stages.

Characteristics: Stink bugs are shield-shaped insects. Rice stink bug adults are metallic brown with pointed shoulders facing forward. Brown stink bug adults are solid brown to mottled brown with rounded shoulders. Brown stink bug immatures (nymphs) are green. Stink bug adults measure up to ½ inch long.



Rice stink bug

Wireworms

Latin name: Numerous species of *Elateridae*

When to scout: Wireworm problems are more likely in wheat fields that recently were in pasture, sod or reduced-tillage grain crops. Wireworms live in the soil and can be sampled by setting up one bait station per 10 acres at least one to four weeks before planting. For each bait station, bury a handful of a mixture of fermented but untreated corn and wheat seeds 2-4 inches deep. Cover with a small mound of soil and clear or dark plastic. After one to two weeks, remove the soil and count the number of wireworms in each bait station. An average of one wireworm per bait station would justify insecticidal control.

Damage: Wireworms can feed directly on and kill the germinating wheat seed after planting. They also can feed on seedling stems and roots, which can result in stand loss or stunting.



Wireworm larva

Characteristics: Wireworms are hard bodied, elongated, shiny, wirelike larvae of click beetles. They have three pairs of legs, measure $\frac{1}{2}$ to 1 inch and are yellowish-brown.

DISEASES



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Bacterial leaf streak and black chaff

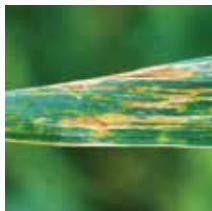
Pathogen: *Xanthomonas campestris* pv. *translucens*

Symptoms and occurrence: Bacterial streak is one of the most common bacterial diseases of cereal crops. The pathogen attacks wheat and other grasses. All of the above-ground parts of the plant may be affected, but the disease occurs most commonly on the leaves and glumes. The early symptoms appear as small, light-brown, water-soaked spots or streaks. The lesions tend to develop between the veins early but eventually expand and coalesce, producing irregular gray-brown blotches. Under high humidity, droplets of yellow bacterial exudate form with the lesions. Small yellowish granules or shiny scales form on the surfaces of leaf blades when the exudate dries. As the disease progresses to the leaf sheaths and adjacent culms, the stems darken and become weak.

Conditions for development: The bacterium persists on plant residues in soil and on host plants and tolerates relatively wide ranges of temperature and moisture conditions. Wheat is invaded through natural openings and wounds and supports the bacterium intercellularly. It is spread by splashing rain, plant contact and spike-visiting insects.



Field view



Foliar symptoms



Foliar and head symptoms

Barley yellow dwarf virus

Latin name: *Luteovirus* and/or *Polerovirus*

Symptoms and occurrence: This viral disease is common and often severe. Several strains of viruses may cause this disease, and all are transmitted by several species of cereal grain aphids. The virus survives in winter grains and often is introduced into northern wheat production areas with cereal aphid flights from the southern states. Barley yellow dwarf symptoms include a golden yellow to reddish discoloration of the leaves, often from the leaf tip downward. If plants are infected early, severe stunting and yield loss may occur.

Management options: Disease management often relies on correct identification of the pathogen; therefore, consult with a LSU AgCenter county agent or specialist. Some sources of genetic resistance (varieties) may be available, and adhering to recommended planting dates may reduce incidence and severity. Timely aphid control through insecticidal seed treatment or foliar insecticides may reduce incidence and severity but may or may not be economical.



Field view



Stunted plant (left)

Downy mildew (crazy top)

Latin name: *Sclerophthora macrospora*

Symptoms and occurrence: Downy mildew usually is associated with wheat plants that are grown in poorly drained areas. Plant symptoms produced by downy mildew are variable. Some diseased plants tiller excessively and are severely dwarfed, with many tillers growing only a few inches tall. Other plants have thickened leaves that are yellow striped, fleshy, twisted, curled and stiff. These plants rarely produce heads, and those heads that are produced are distorted and abnormally large. The stem below the affected heads may be thick and deformed. In bearded varieties, the beards can be distorted and abnormally long. Diseased heads produce no viable grain.



Field view

Management options:

Proper soil preparation to improve surface drainage and remove debris will reduce disease incidence. Avoid planting fields that are prone to flooding. Rotation with noncereal crops and use of clean seed may provide some control. Control of grassy weeds that serve as alternative hosts may reduce disease incidence.



Stunted plant as a result of downy mildew

Leaf rust

Latin name: *Puccinia triticina*

Symptoms and occurrence: This fungal disease is widespread in Louisiana and probably is the most destructive wheat disease. Leaf rust begins in Louisiana during the late winter or early spring and is produced by reddish-orange spores. The leaf rust fungus produces small, yellowish-orange pustules filled with spores on the lower leaves and proceeding upward. Each pustule produces about 2,000 spores daily that are capable of reinfecting wheat. Infected leaves turn yellow and die. Later in the season, as the plants mature, teliospores are produced in dark gray to black flat pustules under the epidermis. Conditions necessary for infection include virulent spores, susceptible wheat



Urediniospore formation



Teliospore formation

plants, several hours of moisture on the leaves (six to eight hours of dew or light rain) and proper temperatures (60-80 F).

Management options: Resistant varieties are the best and least expensive method of control; however, the fungus can rapidly overcome resistance in current wheat varieties. In addition, follow recommended planting dates, maintain fertility and apply fungicides, if warranted.



Leaf rust "hotspot"



Heavy infection

Loose smut

Latin name: *Ustilago tritici*

Symptoms and occurrence: This fungal disease is easily recognized at the time of heading by the characteristic dusty black appearance of diseased heads that emerge from the boot slightly earlier than those of healthy plants. Usually, all grain in a smutted head is completely transformed to black powder made up of microscopic smut spores. The smutted grains shatter easily and only a bare stalk remains at harvest time.

Maximum infection of wheat occurs during flowering. Wind, rain, insects, and other agents carry the spores from smutted heads to the flowers of healthy heads. The spores quickly germinate under moist conditions and infect the young embryo (seed). The smut fungus becomes dormant in seed until an infected kernel is planted. After planting, the fungus becomes active again and grows systemically within wheat plants, where head infection occurs and the cycle continues. Consequently, the amount of infection that occurs in any one year is the result of infection taking place the previous year.

Management options: Effective controls include the use of certified disease-free seed. Registered seed treatment fungicides may be effective. Resistant varieties may be available, but use the latest information because new races of the fungus may arise, rendering previously resistant plants susceptible.



Smutted wheat heads



Head colonization



Rain-washed, infected head

Powdery mildew

Latin name: *Erysiphe graminis* f. sp. *tritici*

Symptoms and occurrence: Powdery mildew is not a major problem of wheat in Louisiana, but the disease may reduce plant vigor, cause lodging and reduce yield, kernel size and test weight. In areas where powdery mildew is severe, losses up to 40 percent have occurred. Leaves may be heavily infected, and entire plants may be killed prematurely. Damage is most



Field symptoms

severe when heavy infection occurs during periods of rapid growth, tillering, stem elongation and head development. Powdery mildew is associated with dense plant growth and cool, moist conditions. Powdery mildew is characterized by a white to light gray, powdery fungal growth on the leaves, leaf sheaths, culms and floral bracts.



Foliar symptoms



Foliar symptoms

Management options: The disease is effectively managed by growing resistant varieties. Crop rotation, deep plowing and volunteer wheat control will reduce the chances of severe infection by removing or avoiding inoculum sources

of the fungus. Mildew is most severe on wheat grown on soils with high nitrogen content. Consequently, maintain balanced soil fertility based on a soil test to avoid conditions of excessive nitrogen. Fungicide sprays rarely are justified.

Scab (*Fusarium* headblight)

Latin name: *Fusarium* spp.

Symptoms and occurrence: Scab, also referred to as *Fusarium* head blight, is a disease of wheat that is distributed worldwide and causes significant yield and quality losses. Spikelets are affected by the fungus resulting in bleaching, sterilization or shriveled grain. Pink to orange spore masses and/or dark-colored perithecia (reproductive structures) may appear on affected heads. In addition, there are persistent mycotoxins produced by the pathogens that may negatively affect humans and livestock. Warm (75-85 F), humid conditions favor infection at or near flowering.

Management options: The pathogens may survive within seed, grass residue, corn debris or wheat chaff. Consequently, corn as the previous crop may increase disease incidence and severity. Management of wheat scab requires an integrated approach, with the development of resistant varieties as the most important measure. Fungicide seed treatments may reduce seed infection, and fungicide applications may reduce disease, but these treatments generally are not economical. Crop rotation and burying previous crop or wheat chaff residues also may be effective in managing scab.



Diseased head (top)



Diagnostic sporulation



Head "bleaching" caused by scab



Perithecia on kernels

Septoria/Stagonospora leaf and glume blotches

Latin name: *Septoria tritici* and *Stagonospora nodorum*

Symptoms and occurrence: Leaf and glume blotches may significantly reduce seed set and seed fill in wheat in Louisiana. Losses are increased when disease initiates prior to heading. Leaf and glume blotches may affect all aerial parts of wheat. Leaf blotches generally begin with water-soaked spots and progress to chlorotic areas that turn reddish-brown to ashy in the centers. Pycnidia, reproductive structures of the fungus, usually will appear as black dots aligned in rows within the lesions. Symptoms on glumes appear as reddish-brown discolorations, and the fungal species that causes glume blotch may cause symptoms on leaves, as well. The pathogens may survive on straw, seed and volunteer wheat, which are sources of primary inoculum. The disease is spread by rain and wind and is favored by wet conditions (minimum of six hours of leaf wetness). Leaf blotches usually occur at lower temperatures (59-68 F) than glume blotch (68-81 F).

Management options: Earlier maturing varieties generally are more susceptible, and risk of disease is increased in minimum-tillage operations. Planting pathogen-free seed and reducing primary inoculum (crop rotation, tillage, volunteer management) may be helpful. Fungicides applied from flag leaf to flowering may provide adequate control and economic benefit.



Field view



Foliar symptoms



Pycnidia formation within lesions

Stem rust

Latin name: *Puccinia graminis*

Symptoms and occurrence: Stem rust is a fungal disease found in Louisiana wheat fields nearly every year, with significant damage occurring only in a few isolated fields. The early maturing winter wheat varieties grown in Louisiana usually escape serious losses caused by stem rust but provide inoculum that blows north and infects later-maturing wheat fields. As the name implies, stem rust can be found on the stem but is not confined there. It also may be found on leaves, sheaths, glumes, awns, peduncles and even the



Field view of stem symptoms



Wheat stem rust symptoms

kernels. The infection first appears on wheat as reddish-brown elongated pustules that produce urediniospores. The urediniospores are the repeating spores that can be easily transported by the wind and continue to reinfect wheat. As the wheat plant matures, the pustules begin to produce the black spores known as teliospores.

Management options: Since the barberry is involved in the complete life cycle of the fungus, destruction of the alternate host is one method of control. Growers should rely on resistant wheat varieties as a control measure, and fungicides may be used to control stem rust when economically feasible.

Stripe rust

Latin name: *Puccinia striiformis*

Symptoms and occurrence: Stripe rust, also called yellow rust, is a fungal disease in Louisiana wheat that occurs during cooler conditions. Primary infections develop from wind-borne urediniospores that can travel long distances. The pustules of stripe rust form narrow strips on the leaves and occasionally on leaf sheaths, necks and glumes. These pustules contain large numbers of light colored yellowish-orange urediniospores. The disease is favored by cool (50-70 F), moist conditions. Above 78 F, production of urediniospores slows, and black teliospores occasionally are produced. Under favorable conditions, large numbers of pustules are produced on leaves in Louisiana. Severe infections may cause reduced numbers of kernels, shriveled seeds and lowered test weights.



Foliar symptoms of stripe rust

Management options: The use of resistant varieties usually is the best and least expensive control method. Other methods include following recommended planting dates,



Magnified view of stripe rust symptoms

maintaining fertility and foliar fungicide applications, if warranted. It is important to protect the flag leaf from infection until after the kernels have filled.

Tan spot

Latin name: *Pyrenophora tritici-repentis*

Symptoms and occurrence: Tan spot of wheat may significantly affect wheat alone or in conjunction with other leaf-spotting complexes in Louisiana, particularly when infection occurs during heading. The disease may occur on upper and lower leaf surfaces causing tannish-brown, elliptical lesions with yellow margins. Pseudothecia, fungal reproductive structures, may be evident as dark, raised specks on stems. The pathogen survives on wheat debris, which is the source of primary inoculum. Infection is favored by humid conditions at temperatures of 64-82 F, and the pathogen is dispersed when spores produced in lesions are moved by dew, rain and/or wind.

Management options: Cultivars may be available that have resistance to tan spot. Similar cultural practices to those recommended for Septoria/Stagonospora leaf and glume blotches (such as crop rotation, reducing residue and increased tillage) may be effective at reducing disease incidence and severity. Fungicide applications from boot to flowering may be effective and provide economic returns.



Foliar lesions associated with tan spot

Wheat soil-borne mosaic virus

Latin name: *Furovirus*

Symptoms and occurrence: Soil-borne wheat mosaic virus usually occurs only on fall-planted wheat. Losses due to this disease may vary with variety, virus strain and prevalent environmental conditions. Symptoms include mild green to prominent yellow mosaic patterns on leaves, with evident stunting of plants. The virus is introduced to plants by a soil-borne fungus that is more prevalent in low-lying or wet areas. Cool (50-68 F), wet conditions favor infection in the fall, and disease progression is halted above 68 F. The virus survives in the soil along with the vector and may be spread by cultivation, wind, water and/or equipment.

Management options:

Varietal resistance is the most effective means of managing this disease. Crop rotation or late planting also may be effective management tools.



Discoloration of wheat leaves caused by wheat soil-borne mosaic virus

OAT DISEASES



www.LSUAgCenter.com/wheatoats

Barley yellow dwarf virus

Pathogen: *Luteovirus* and/or *Polerovirus*

Symptoms and occurrence: More than 150 species of grasses are susceptible to the barley yellow dwarf virus, and at least 25 different species of aphids vector the phloem-limited pathogen. Stunted plants with reduced root masses are one result of infection. Reduced head emergence and grain yield may result from severe infections. Barley yellow dwarf virus in oats may cause water soaking and discoloration of oat leaves to tan, orange, red or purple. Cool temperatures (59-65 F) favor symptom expression.

Management options: Disease management often relies on correct identification of the pathogen; therefore, consult with a LSU AgCenter county agent or specialist. Some



Discoloration and stunting caused by barley yellow dwarf virus

sources of genetic resistance (varieties) may be available, and adhering to recommended planting dates may reduce incidence and severity. Timely aphid control through insecticidal seed treatment or foliar insecticides may reduce incidence and severity but may or may not be economical.

Crown rust

Pathogen: *Puccinia coronata* var. *avenae*

Symptoms and occurrence: Crown rust, also called leaf oat rust, is a disease common to susceptible varieties grown in Louisiana. In most years, this is the most widespread disease affecting oats in Louisiana. Disease development is favored when temperatures are 60-77 F and moisture is present. Initial symptoms occur during early spring as yellowish-orange round to oval raised pustules (blisterlike) on the upper and lower leaf surfaces. Each pustule contains hundreds of yellowish-orange spores that are spread to adjacent plants and fields by the wind. When disease is severe, pustules can develop on the leaf sheaths. When pustules are several weeks old, a black ring may be present on the margin. This ring consists of black spores of the fungus that are capable of surviving



Field symptoms of crown rust



Urediniospores (top) and *teliospores* (bottom) of oat crown rust

during moderate summers. Severely affected plants can be stunted and have reduced root systems. If not properly managed, yield loss can occur.

Management options:

This disease is managed using resistant varieties. Plant as early as possible.

Downy mildew (crazy top)

Pathogen: *Sclerophthora macrospora*

Symptoms and occurrence: Downy mildew is a fungal disease that affects more than 140 species of plants and usually occurs in poorly drained or flooded areas in oats. Infected plants will display excessive tillering and severe stunting and may die. Plants that survive the infection will be deformed, with twisted or curling leaves. If infected plants produce heads, panicles will be deformed and have no viable grain.

Management options: Proper soil preparation to improve surface drainage and remove debris will reduce disease incidence. Avoid planting fields that are prone to flooding. Rotation with noncereal crops and use of clean seed may provide some control. Control of grassy weeds that serve as alternative hosts may reduce disease incidence.



Healthy oats (left) and oats with downy mildew (right)

Loose smut

Pathogen: *Ustilago avenae*

Symptoms and occurrence: Loose smut is a fungal disease that is evident at heading. Black powdery spore masses are present where kernels should have been. These spore masses are easily dispersed by wind, rain, or any other physical movement. Infection occurs at germination. The fungus lives systemically within plants throughout the entire season and replaces oat kernels with spores, which, in turn, come in contact with healthy panicles.

Management options: Effective controls include the use of certified disease-free seed. Registered seed treatment fungicides may be effective. Resistant varieties may be available, but use the latest information because new races of the fungus may arise, rendering previously resistant plants susceptible.



Healthy oats (left) and smutted oats (right)

Pyrenophora (Helminthosporium) leaf blotch

Pathogen: *Pyrenophora chaetomioides*
(*Helminthosporium avenae*)

Symptoms and occurrence:

Pyrenophora leaf blotch is a fungal disease that potentially can cause losses up to 40 percent in oats. The pathogen is seedborne, surviving superficially on seed coats or within seed as mycelia. Foliar symptoms begin with small spots with white centers and brown to red margins. Lesions elongate and become dark with olive/gray centers. Plants affected by Pyrenophora leaf blotch also may have a discoloration of the stem at the nodes called "black stem." Mycelial masses may be evident within stems, and the fungus may cause lodging between the third and/or fourth internodes. Infected grain will have a darkened surface. The fungus may survive on and within infected grain and on crop debris.

Management options: Any operation that decreases previous crop debris may reduce inoculum. Crop rotation and destruction of volunteer oats will reduce chances of pathogen survival. Seed treatments may be somewhat effective.



Early foliar symptoms



Infected oat seeds

Septoria leaf blotch

Pathogen: *Septoria avenae*

Symptoms and occurrence: Septoria leaf blotch is a fungal disease that may affect all above-ground parts of oats. Foliar symptoms begin with yellowish to brown, round to diamond-shaped lesions with brown margins. Leaves may be yellowed outside of the lesion margins. Black dots (pycnidia or fungal reproductive structures) scattered throughout the lesion centers usually will be evident. Lesions may coalesce, causing premature leaf death. This fungus also causes black stem, where gray to black discoloration occurs on culms at the upper joints. Infections may cause lodging, and grayish mycelial growth may be evident within stems. Kernels may be affected, as well, resulting in a darkened appearance. The fungus survives on crop debris and usually is not seedborne.

Management options: Any operation that decreases previous crop debris may reduce inoculum. Crop rotation and cultivation may reduce chances of infection. Seed treatments may be somewhat effective, and foliar fungicide application may be warranted.



Diamond-shaped lesions of Septoria leaf blotch

Stem rust

Pathogen: *Puccinia graminis* var. *avenae*

Symptoms and occurrence:

Stem rust is a disease that occurs occasionally on susceptible varieties grown in Louisiana. This disease is not as common as crown rust, but when it occurs, it is more prevalent in the southern part of the state.

Disease development is favored when temperatures are 68 -77 F and moisture is present. Initial symptoms occur during early spring as reddish-brown, elongated raised pustules (blisterlike) on the stems, leaf sheaths and the leaf surfaces. Each pustule contains hundreds of



Field view of oat stem rust



Stem rust symptoms

reddish-brown spores that are spread to adjacent plants and fields by the wind. If not properly managed, yield loss can occur.

Management options: This disease is managed using resistant varieties.

OTHER ISSUES



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Waterlogging stress in wheat and oats

Occurrence: Waterlogging stress occurs in wheat and oats when the soil remains saturated or flooded for more than a few days due to poor infiltration or inadequate surface drainage, typically on heavier soils. Waterlogging stress typically occurs during seedling and tillering stages during the winter and results in poor shoot and root growth and delayed plant development. Damage to the plant occurs due to lack of oxygen in the root zone that inhibits root respiration and metabolic function, coupled with toxic accumulation of trace elements under the resulting conditions. Root growth can be inhibited and result in inability to uptake applied fertilizers and tolerate drought stress later in the season.



Field view of waterlogged wheat plants

Symptoms often are uneven across the field and include stunted, yellowed plants with delayed maturity in lower areas or heavier soil regions of the field. Symptoms can resemble those of soil compaction or nitrogen deficiency, but waterlogged plants may not respond to higher nitrogen due to stunted root growth. Flooding during reproductive growth can result in poor grain fill, early maturity in patterns across the field and low yields. Downy mildew, caused by a water-loving fungus, often occurs as a result of waterlogging stress as do root rots.

Management options: Good surface and internal drainage are the best options to prevent waterlogging in fields. Surface water drains should be put in place prior to or at planting. Higher top-dressing nitrogen rates may partially offset symptoms by stimulating vegetative growth if waterlogging is not severe and prolonged.

Freeze damage in wheat and oats

Occurrence and symptoms: Damage to wheat and oats from cold weather can occur in the winter during vegetative growth or in the spring after jointing and head initiation.

Wheat in Louisiana remains green and grows throughout the winter. The damage that occurs during winter months is normally loss of leaf tissue and has minimal effect on crop development and yield, usually just browning of leaf tips on younger leaves. Such damage occurs when warm weather that results in rapidly growing leaves and nonhardened tissue is followed by temperatures well below freezing. Wheat that is exposed to gradually colder temperatures undergoes physiological changes and “hardens off” so that temperatures in the teens cause minimal leaf tissue damage. Occasionally, however, very cold temperatures (single digits) completely kill above-ground tissue and can result in stand loss. But the below-ground growing point normally recovers, and the plant puts out new leaves when normal weather returns.

The most severe damage to wheat from low temperatures occurs after jointing to rapidly expanding stems and developing



Frozen wheat heads



Frozen seedling leaf damage

heads that have little protection against cold. This most commonly occurs when a warm midwinter is followed by a hard freeze in March. Temperatures just below freezing for a few hours can severely damage developing stems and heads and can sterilize pollen if heads are near emergence, resulting in apparently healthy heads at maturity that, when examined have very few seeds.

Sometimes portions of the head are killed, leaving misshapen heads. The extent of yield loss depends on how late in the spring the cold damage occurs and how much time the plant has to develop new head-producing tillers.



Frozen young head extruded

Management options: Planting date and variety choice are really the only options to avoid cold damage. Earlier-heading varieties are more prone to spring freeze damage and should be planted later, after the midpoint of the recommended planting window. Planting later helps prevent early varieties from jointing and developing reproductively while there is still a high probability of damaging temperatures. Likewise, planting later slows crop development and helps guard against spring freeze damage. Varieties with later than average heading dates can be planted earlier since their natural growth pattern is to develop later in the spring.

Glyphosate drift on wheat

Glyphosate is the most widely used herbicide for preplant burndown prior to planting summer crops in Louisiana. Unfortunately, timing of preplant burn-down applications occur during a time of peak growth in wheat (i.e., panicle initiation, heading, etc.).

Drift of glyphosate onto wheat can occur both from aerial and ground applications. Research has shown that glyphosate at 2 and 4 ounces per acre reduced wheat yield 57 percent and 62 percent, respectively, when the drift event occurred when wheat was at the first node growth stage. In addition, when wheat was heading, glyphosate drift at 2 and 4 ounces per acre reduced yield 26 percent and 45 percent, respectively. This data indicates wheat is very sensitive to glyphosate drift.



Glyphosate drift symptom on flag leaf



Field view of glyphosate drift

Phosphorus deficiency in wheat

Symptomology: During early season crop growth, initial phosphorus deficiency symptoms are reduced growth and vigor of seedlings. As the wheat plant progresses, phosphorus deficiency negatively affects tiller production.

This will result in stands that appear thin. Additionally, phosphorus-deficient leaves have very dark green to reddish to purple appearance. These symptoms typically occur in the older leaves, while the younger and newly emerged leaves remain green.



Phosphorus deficiency during early season growth (Note the emergence of newer leaves that remain green, while older leaves are affected)

Prevalence in the field:

Phosphorus deficiencies often occur in cold, wet soils. This can be a more significant problem for later planted wheat in Louisiana, which often is planted into these conditions. Phosphorus deficiencies typically are more widespread across the field than many other nutrient deficiencies.

Nutrient correction: Once phosphorus deficiency symptoms occur in field, it often is difficult to adequately correct for the current growing season due to the immobility of phosphorus in the soil system as well as yield damage that potentially has already occurred. Use the current growing season as a tool to correct for future growing seasons. To compound the difficulty of phosphorus deficiencies, phosphorus deficiencies often can be a secondary response to other stress symptoms, such as flooded conditions, frost stress or lowered pH, which must be corrected for deficiencies not to occur.

Potassium deficiency in wheat

Symptomology: Potassium deficiencies typically shows up as leaf chlorosis (yellowing) early in the deficiency or during mild cases. This yellowing will become necrotic (dead plant tissue) rapidly as the deficiency persists. This deficiency will initiate at the leaf tip and along the leaf margins, but as the deficiency progresses, the entire leaf will be affected.



Chlorosis of the leaf margin with necrotic leaf tips (Note the resemblance to drought stress)

Additionally, the deficiency will begin with the oldest leaves, while the youngest remain green. The symptoms will progress up the plant, however, as the deficiency persists. Long-term deficiency symptoms of the plant will resemble drought stress, which will result in lowered test weights.

Prevalence in field: Potassium deficiencies in the field can be very sporadic. They often are associated with sandier textured soil. Even in high clay content fields, however, sand veins often can show significant potassium deficiency.

Nutrient correction: With the immobility of potassium in soil systems, it often is difficult to correct for potassium deficiency in season. The use of foliar potassium has shown promise in other cropping systems, but very little still is understood. Therefore, these should be used cautiously, and consultation with a LSU AgCenter specialist or extension agent is recommended.

Sulfur deficiency in wheat

Symptomology: Sulfur deficiencies result in decreased plant growth, due to lack of protein formation. Deficient plants typically have general paleness of the entire plant with chlorosis of the newer leaves. Initial symptoms begin at the tip of the youngest leaves and progress to the base. The progression often is so rapid, however, differences are not evident. Sulfur deficiencies can be misidentified as nitrogen deficiencies, but the symptoms will not be alleviated by supplemental nitrogen applications.

Prevalence in the field: While nitrogen and sulfur deficiencies do not necessarily occur together, since, similar to nitrogen, sulfur is mobile in soil systems, deficiency patterns resemble that of nitrogen, sulfur deficiencies, however, are more prone in sandier soils and soils with low organic matter content. Additionally, because sulfur is mobile, areas with high leaching potential also will be areas that show sulfur deficiencies.

Nutrient correction: Since sulfur is mobile in the soil, it is easier to correct for than immobile elements. But, since sulfur plays such a vital role in protein synthesis, plants often can exhibit what is called “hidden hunger.” Significant yield can be lost prior to any visual symptom. Additionally, due to the difficulty distinguishing between nitrogen and sulfur deficiencies, tissue analysis often will need to be done. While the effectiveness is not well known in wheat, in-season adjustment can be carried out through the use of sulfate fertilizer sources.



Comparison between sulfur deficient wheat (right) and unaffected wheat (left)



Note the overall paleness of the plant, with significantly lighter leaves in the upper canopy

Vernalization failure in wheat

Description: Winter wheat in Louisiana is planted in the fall and undergoes physiological changes during winter exposure to cold weather (32-50 F) that trigger initiation of reproductive growth (jointing) and heading. Most winter wheat varieties require from two to eight weeks of exposure to cool temperatures to induce heading. This process is called "vernalization." After vernalization requirements have been met, rate of development toward heading is influenced by temperature (heat units) and, to some extent, photoperiod. Varieties developed in the Midwest often require greater periods of vernalization, while spring wheat varieties have no cold requirement. Heading date is roughly correlated with the vernalization requirement in that early heading varieties generally require fewer days of vernalization than later-heading varieties.

Wheat varieties that do not properly vernalize will not head properly and will have reduced yield or no yield. In many cases, heat units and photoperiod eventually cause the variety to partially head out, but head density will be greatly



Improper vernalization (left) and proper vernalization (right)

reduced and maturity will be delayed and nonuniform. These fields have a very ragged appearance in late spring with “bolted” heads spread across the field. Some varieties segregate for vernalization requirement and will appear uniform in normal winters but have partial heading in warm winters. Nonvernalized plants may put out large numbers of leaves that become yellowed with age.

Management options: Growers should not plant a variety that has not been tested in Louisiana since there are many wheat varieties that are adapted to more northern states that will fail in Louisiana. Avoid planting varieties that have very late relative heading dates, and match planting date to variety. Varieties with moderately late heading dates should be planted on the early side in north Louisiana, and those with early heading dates should be planted late (to avoid spring freezes). Growers in central and south Louisiana should avoid late-heading varieties since these may fail to vernalize in some years.



Proper vernalization (left) and vernalization failure (right)

To find more details about wheat and oat production, visit these websites from the LSU AgCenter and others:

Wheat and Oat Web Portal

www.LSUAgCenter.com/wheat

Wheat and Oat Weeds

www.LSUAgCenter.com/wheat/weed+control

Wheat and Oat Insects

www.LSUAgCenter.com/wheat/insects

Wheat and Oat Diseases

www.LSUAgCenter.com/wheat/diseases

Wheat and Oat Disease Publications

[www.LSUAgCenter.com/en/communications/publications/
Publications+Catalog/Crops+and+Livestock/Grain+Crops/](http://www.LSUAgCenter.com/en/communications/publications/Publications+Catalog/Crops+and+Livestock/Grain+Crops/)

Wheat and Oat Variety Trials and Production Guidelines

[www.LSUAgCenter.com/en/crops_livestock/crops/
WheatOats/Variety+Trials++Recommendations/](http://www.LSUAgCenter.com/en/crops_livestock/crops/WheatOats/Variety+Trials++Recommendations/)

Weed Science Society of America Photo Gallery

<http://wssa.net/Weeds/ID/PhotoGallery.htm>

For the Louisiana wheat and oat industry to remain viable, it is essential that producers and consultants be able to identify and manage existing and emerging weed, insect and disease issues.

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- J. A. Martinelli and M. T. Pacheco, UFRGS, Brazil (Pyrenophora leaf blotch, page 49; Septoria leaf blotch, page 50)
- Larry Steckel, University of Tennessee (horseweed, page 14; wild garlic, page 22)
- Randy Weisz, North Carolina State University (deficiency photos, pages 57-59)
- <http://www.natronacountyweeds.com/weed-identification/> (cheat, page 9)
- http://oak.ppws.vt.edu/scott/weed_id/allvi.htm (wild garlic, page 22)
- http://courses.missouristate.edu/pbtrewatha/spotted_burclover.htm (burclover, page 7)
- <http://www.viette.com/v.php?pg=974> (wild onion, page 23)



Wheat and Oat Weed, Insect and Disease Field Guide

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