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Seed Source

Seed quality is an important factor for determining soft red winter wheat seeding rates.

Thoroughly clean bin-run wheat to ensure purity. This includes removing weed seeds, stover trash, and fungi-infected wheat seeds. Fungi-infected seeds and tombstones will not germinate — seed treatments cannot bring them back to life, so you should not plant such seed lots.

High quality seed lots have germination values greater than 90 percent. In addition to high-quality seed, use certified wheat seed to ensure that you have the desired cultivar (and the traits associated with it).

Seeds infected with the fungus that causes head scab are usually chalky to pink and will not germinate.

Growth Stages

Management decisions in wheat production depend on growth stages. Fertilizers, herbicides, and fungicides are most effective and profitable when applied at specific times during wheat development. Applying certain chemicals at the wrong growth stage may be ineffective or damage the crop. Understanding how to correctly identify wheat growth stages can help producers make timely and profitable management decisions.

In this guide, we use the Feekes scale. The Feekes scale begins at 1.0 (which describes emergence) and ends in 11.4 (which describes a mature plant that is ready for harvest). The sections below describe the stages in the Feekes scale.

For more information about the Feekes scale, see *Managing Wheat by Growth Stage* (Purdue Extension publication ID-422-W,), available from the Purdue Extension Education Store, www.the-education-store.com

Feekes 1: Emergence (Spiking)

When growing conditions are favorable, spiking can occur as soon as 7 to 10 days after planting.

Other Stress Factors

Snagged and S-Shaped Grain Head

During heading, cold temperatures can slow emergence and allow the tip of the head to "snag" on the flag leaf collar. The snagged head will eventually pull away from the flag leaf collar or push through the flag leaf collar — which causes the head to form an S shape.

1/8 *Adult*

Hessian Fly

Mayetiola destructor

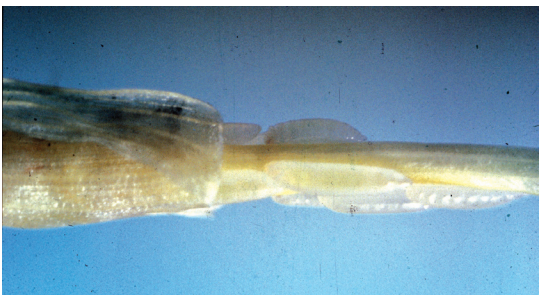
Description: Adults are gray to black, gnat-like flies. Larvae are pale, yellowish white maggots. Maggots, unlike grubs and caterpillars, lack defined heads and legs. Puparia are dark brown and resemble (and are often called) "flaxseeds."

Time of Attack: April to late June (Feekes stages 4.0-11.0); late August to late October (Feekes stages 1.0-3.0).

Damage: Larvae feeding on stems in early summer may cause infested stems to snap over once the heads begin to fill — leading to yield losses. Infested wheat in the autumn is stunted, dark green, and its leaves are broader than normal. Injured plants will not grow past the four-leaf stage and generally die during the winter.

Sampling: Examine 20 stems in 5 areas of a field, record number of damaged stems, and determine the percentage of infested stems. Sample in late summer/early autumn (18-21 days after plants emerge) and

Pupae



Larvae

again in spring (when wheat heads begin to fill).

Economic Threshold: No economic thresholds have been established.

Suggested Management: Until definite threshold guidelines are established, any level of Hessian fly infestation in this year's wheat crop demands that the next crop be planted with the most up-to-date Hessian fly-resistant varieties after the "fly-free" date for that particular locale (see Average Hessian Fly-free Dates page 14).

Reference: Purdue Field Crops IPM, extension.entm.purdue.edu/fieldcropsipm.

Fusarium Head Blight (FHB, scab)

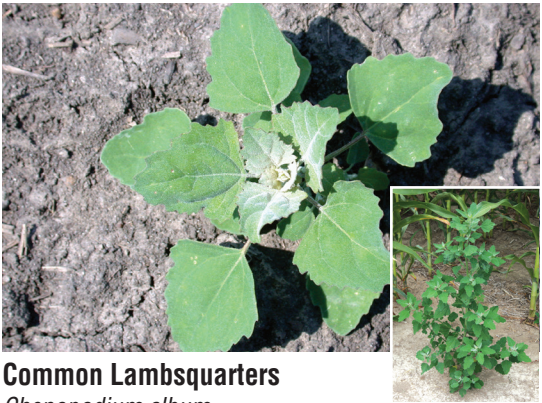
Fusarium graminearum

Description: Bleached spikelets are present on green heads. Spikelets above or below the infection point may also become bleached. Pink to orange spore masses may be visible in humid, wet weather. Infected kernels are shriveled, discolored, and lightweight.

Scouting: Heading through maturity (Feekes 10.0-11.0).

Epidemiology: This fungus survives through the winter in infected corn residue. High humidity and frequent rainfall promote the production and dispersal of spores from residue. The wind can blow spores onto wheat plants. Wheat is susceptible at flowering through early dough (Feekes 10.5.1-11.0). Warm (75-85°F), humid weather promotes infection and secondary spread.

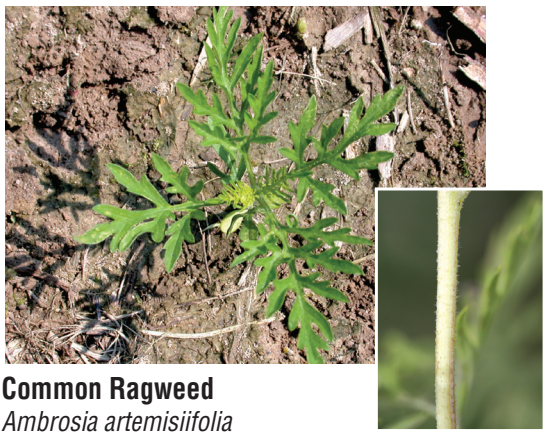
Management: Select moderately resistant varieties and avoid planting wheat into corn stubble. Plant high-quality, certified seed. Triazole fungicides are available to manage the disease at early flowering, but may not provide complete control.



Common Lambsquarters

Chenopodium album

Leaves are slightly toothed and coated with a white, mealy substance, especially on young plants. Annual.



Common Ragweed

Ambrosia artemisiifolia

True leaves are mostly deeply lobed, but can occasionally be entire, and may be hairy. Cotyledons are rounded, thick, and short. Stem is rough to the touch. Annual.

Downy Brome

Bromus tectorum

Sheath: Closed on lower leaves, hairy
Ligule: Visible membrane with a frayed margin
Blade: Hairy on both sides
Auricles: None

Fall Panicum

Panicum dichotomiflorum

Sheath: Round
Ligule: Fringe of hairs
Blade: Smooth, prominent midvein
Auricles: None

Growth regulator injury on wheat. These herbicides can cause onion leafing (bottom).

Growth Regulators

Action: Growth regulator herbicides can be taken up from the soil by the root system. However, most growth regulator herbicides are used as postemergence treatments and cause more damage to the shoot system than to the already established root system.

Injury: Preemergence applications can cause buggy whipping or onion leafing in emerging wheat. Postemergence applications to wheat outside of the acceptable window can cause a variety of injury symptoms, including seed head malformation and yield loss.

Herbicides that Injure Wheat: 2,4-D, dicamba, MCPA.

Aboveground Crop Nutrient Content and Nutrient Removal in Harvested Portion

Crop Part	Yield Unit	Nutrient Content (lbs./plant part)[1,2]		
		N	P_2O_5	K_2O
Grain	Bu (13.5% moisture)	1.0	0.45	0.29
Straw	Per bu of grain[3]	0.53	0.12	1.2
Straw	Per ton of straw (9.2% moisture)	11.6	2.7	26

[1] These values multiplied by grain yield or tons of straw=total amount of nutrients. Fertilizer recommendations may be higher or lower than crop uptake or removal depending on the soil nutrient contribution and the efficiency of fertilizer nutrient utilization.

[2] **Source:** USDA-Natural Resources Conservation Service Nutrient Content of Crops website, plants.usda.gov/npk. Values based on wheat-bread-soft red winter for grain, and wheat-winter for straw.

[3] Assumes 92 lbs. of straw produced per bushel of grain.

Nitrogen Recommendations

Rate

The following nitrogen (N) recommendations for wheat assume that the crop is planted during the optimum planting period on mineral soils with 1 to 5 percent organic matter, has either good natural or improved drainage, and that the proper cultural practices are utilized.

The recommended N rate is based on the relationship: N (lbs./A) = 40 + [1.75 x (yield potential - 50)]. No credits are given for the previous crop. To prevent serious lodging on high organic matter soils (greater than 20 percent organic matter), reduce the N rate calculated from the equation by 30 to 50 pounds per acre.

Timing

Apply 15 to 30 pounds of N per acre at planting and the remainder between green-up in spring and Feekes 6.0 (jointing, page 32). In N-deficient crops, delaying

Phosphorus (P)

- Stunted, dark green plants with purpling or reddening of tips and leaf margins on young plants
- Dark green to bluish green appearance of whole field
- Thin stands due to reduced tillering
- Delayed heading and maturity

Conditions Favoring

- Low soil test for available P
- Cold soils, either too wet or too dry
- Poor root growth in compacted or low-pH soils
- Root damage by insects, diseases, or chemicals