
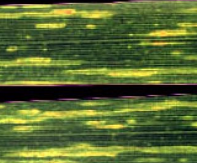









Early Season Symptom Chart

Disease	Time of Infection	Symptoms	Time of Symptom Appearance	Field Distribution/ Location on Plant	Management
Wheat soilborne mosaic virus  Photo: A. Koehler	Primarily fall, vectored by protozoan <i>Polymyxa graminis</i> .	Stunting, leaves with chlorotic mosaic, irregular mottling, and streaking.	After spring green up. Symptoms not expressed on leaves emerging after the average temperatures reach 68°F +.	Irregular, chlorotic patches in the field often in low-lying wet areas. Movement in the plant depends on temperature. High temps limit movement into developing leaves.	Planting resistant cultivars is the most economical management approach. <i>P. graminis</i> can survive in soils for many years.
Wheat spindle streak mosaic virus  American Phytopathological Society	Primarily fall, presumed to be vectored by protozoan <i>Polymyxa graminis</i> .	Chlorotic streaks that are elongated and spindle-shaped, often with a dark green island in the center.	After spring green up. Symptoms are most severe following a cold winter.	Symptoms are initially uniform across the field, but fade as temperatures warm.	Planting resistant cultivars is the most economical management approach. <i>P. graminis</i> can survive in soils for many years.
Wheat streak mosaic virus  Crop Protection Network	Primarily early fall, vectored by the wheat curl mite.	Rolled leaves can indicate mite presence. Young leaves show yellow mosaic pattern of parallel discontinuous streaks. Yellowing can occur on whole leaves.	Cool springs will delay the onset of symptom appearance, while an early, warm spring will maximize impact to plants. Symptoms can be observed from tillering through ripening.	Margins of the field are often affected first. Symptoms are typically most severe on oldest leaves, with youngest leaves showing most characteristic mosaic symptoms.	Destruction of volunteer wheat, later planting date, and avoiding susceptible crops may help lower mite populations.
Barley Yellow Dwarf Virus  Photo: A. Koehler	Primarily fall, by aphid vectors. Spring infection can occur but, is not usually as severe.	Flag leaves can be yellow, orange, red, purple, or brown and necrotic. Shortened internodes may result in shorter plants.	Typically becomes most apparent after flag leaves have emerged.	Yellowing/ purpling of flag leaf tips is usually in scattered locations throughout the field.	Adjusting planting to avoid peak aphid populations can help lower disease the following spring. Treated seed may help to manage aphids.

Early Season Symptom Chart

Disease	Time of Infection	Symptoms	Time of Symptom Appearance	Field Distribution/ Location on Plant	Management
<p>Bacterial streak and Black Chaff</p>  <p>Photo: Mary Burrows, Montana State University, Bugwood.org</p>	<p>Seedborne, seed is the most common primary inoculum source.</p>	<p>Water-soaked lesions extend along leaf margins and midrib. When backlit, lesions look translucent. Lesions turn yellow, then brown and necrotic. (Can be easily confused with Septoria tritici blotch.)</p>	<p>Leaf symptoms most noticeable after heading. Symptoms on the head include black, longitudinal stripes on the glumes and purple-black lesions on the peduncle and rachis.</p>	<p>After heading many lesions will appear suddenly on the upper leaves without noticeable progression from lower leaves. Lesions tend to be more abundant where dew remains at the bend of the leaf.</p>	<p>Pathogen is primarily seedborne. Seeds can be tested to determine level of infestation, but no commercial seed treatments are available.</p>
<p>Spring Freeze Injury</p>  <p>Photo: A. Koehler</p>	<p>n/a</p>	<p>Reproductive stages are most sensitive to frost. Damage is worse on leaf tips and newer leaves. Leaf chlorosis, burning of leaf tips, heads trapped in boot, floret sterility, white awns or heads.</p>	<p>Effects of freeze injury usually become visible 3-4 days after the freeze event.</p>	<p>Widespread across the whole field. Yellowing may occur primarily in low areas indicating freeze injury where cold air settled.</p>	<p>Later maturing varieties may have a better chance of avoiding damage from frost events.</p>
<p>Physiological Leaf Spots</p>  <p>Photo: A. Koehler</p>	<p>n/a</p>	<p>Leaf spotting not attributed to a biological pathogen.</p>	<p>Timing can vary from contributing factors. Environmental stress, mineral imbalances, resistance gene reactions to rust fungi, aerial drift of fine droplets of nonselective herbicides, and other factors could lead to physiological leaf spots.</p>	<p>Usually present across the whole field. May vary by variety, particularly for resistance gene responses.</p>	<p>n/a</p>