MONTANA STATE UNIVERSITY | EXTENSION

Spring 2010

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Weather conditions this spring have set us up for quite a year in dry-land agriculture for Hill County. The cool wet weather is good for crops and pests alike. Scouting your crops will become especially important as some diseases can develop quickly. Some of the diseases we can manage now whereas others must be managed by crop rotation, variety selection, seed treatment and other cultural or chemical measures. I have included an article on Black grass bugs. Black grass bugs started showing up in Hill County last year and I have had calls with concerns of damage this year. The damage is usually on field edges and roadways. Rhizoctonia Root Rot is showing up again. Proper management when spraying weeds and volunteer crop help to manage this problem. Stripe rust is on the watch list. Our spring conditions make this a potential concern and the Mountain Pine Beetle is a concern if you have pine trees on your property. Watch for grasshoppers as the season progresses. Conditions can change quickly so monitor your crops and enjoy the moisture that has made us so green this spring.

Joe T. Broesder
Hill County Extension Agent

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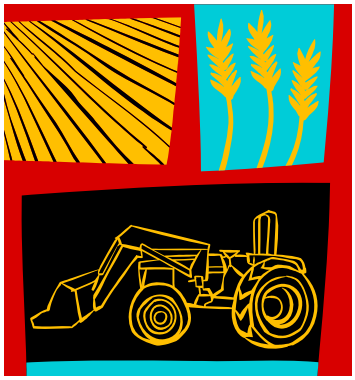

Protect Wheatgrass from Black Grass Bugs

By Sue Blodgett, PH.D., Formerly Department of Animal and Range Sciences, Montana State University
Reprinted from 2006: animalrangeextension.montana.edu/articles/forage/general/protectwheatgrass.pdf

The black grass bug is native to the western United States and has been reported damaging wheatgrasses in the western U.S. Black grass bug (BGB) feeding damage has been documented to reduce yield, plant height and seed head production.

Identification
Black grass bugs can reach one-quarter to three eights of an inch in length when mature and are black in color. One species, L. *hesperius* has light colored outer margins of the wings. Immature stages are similar to adults but smaller in size. Black grass bug adults live for about four weeks laying eggs before dying. There is only one generation of these bugs each year occurring in early summer in most Montana locations. Because adult wings are reduced, damaging species cannot fly, so significant infestations may remain fairly localized and spread occurs slowly each year of infestation.

Damage
Black grass bugs overwinter as eggs in grass stems, hatching in the spring as grass plants begin to grow. Both adult and immature stages have mouthparts that pierce plant tissue and suck out plant juices leaving a series of small white marks where they have fed, called stippling. When large numbers of black grass bugs are present, white marks coalesce to cause leaves to appear pale or light green in color. Damaged leaves appear to be 'frosted' and damage and has been mistaken for frost damage. Repeated infestations have been noted to kill host plants.

Forage Quality
It has been observed by many ranchers that black grass bug activity and feeding damage makes the grass unpalatable and reduces intake. We examined the impact of BGB damage on intermediate wheatgrass quality. During the 1995-1997 growing seasons, the sites also harbored relatively high densities of black grass bugs. The maximum black grass bug damage recorded resulted in a 42.4 percent reduction in crude protein compared with undamaged tissue. Acid detergent fiber and neutral detergent fiber increased as black grass bug damage increased. Percent forage sulfur and phosphorus concentrations decreased as black grass bug damage increased. There was no significant relationship between black grass bug damage and In vitro dry mother digestibility.

Management
Black grass bug can have a serious impact on quality and quantity of forage grass production. Black grass bugs prefers many wheatgrass species; including crested, intermediate, slender wheatgrass, and Kentucky bluegrass, orchard grass, smooth brome and mountain brome. Black grass bugs have been noted to damage wheat fields in Montana, although generally feeding is restricted to field edges adjacent to pasture, range or CRP. A study conducted by O'Neill et al. found that increased grazing intensity reduced black grass bug populations. Insecticides are not commonly used for black grass bug management.

Stripe Rust

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History: Stripe rust was first described in Europe in 1777. First reports in the United States date from the early 20th century. Historically it has been a problem in the Pacific Northwest, California and the higher mountain valleys. Yield losses of up to 25% have been reported from Washington State. Over the last few years, stripe rust has become increasingly important in the Great Plains, particularly the south-central states. This is probably due to the development of new strains which tolerate a much broader range of temperatures, and infect a broader range of wheat varieties.

Causal agent: *Puccinia striiformis* f. sp. *tritici*. *P. striiformis* f. sp. *tritici* is a pathogen of wheat, but can infect some susceptible barley varieties. Stripe rust of barley is caused by a different subspecies, *Puccinia striiformis* f. sp. *hordei*. As with other cereal rusts, physiological races of this pathogen that are able to infect different varieties of wheat (sometimes called strains) are common.

Symptoms: Stripe rust is characterized by bright yellow-orange pustules arranged between the veins in stripes. In Europe and many parts of the world, stripe rust is known as 'yellow rust' because of the distinctive coloring of the pustules. Stripes are not formed on seedling leaves. Atypical symptoms for stripe rust, including yellow spotting, can occur on varieties with resistance to some strains.

Occurrence: Whenever there is green plant tissue. Stripe rust is considered a cool season disease, and is most severe in spring and early summer (May to July). This disease usually appears earlier in the season than other rusts because it can develop at cooler temperatures. Dark-brown to black teliospores (sexual spores) will appear as the plant matures and the temperatures rise. Stripe rust does not have a known alternate host. Perennial grasses can serve as an important reservoir of inoculum.

Life cycle of the pathogen: Stripe rust survives in green tissue, and in colder climates has been known to survive as dormant mycelium under snow cover. It travels by wind from neighboring wheat-growing regions, but can also overwinter on wheat and perennial grassy weeds. The pathogen is favored by cool, wet conditions. Several asexual disease cycles can occur in a single season.

In Montana, winter wheat is usually more severely affected by stripe rust since the pathogen can overwinter and increase early on the crop. Depending on temperature and moisture, stripe rust can move into spring wheat and cause appreciable damage.

In South Dakota, stripe rust does not appear until the winter wheat is far enough along that losses are minimal. In contrast, stripe rust has been an issue in spring wheat during cool summers.

Management Approaches

Cultural

- Plant varieties with at least a moderate level of resistance. Check your local variety recommendations.
- Eliminate grassy weeds and volunteer wheat at least 3 weeks before planting to prevent a 'green bridge' for movement of the pathogen.
- Scout winter wheat in the fall and spring for stripe rust.

- Examine the fence rows, ditch banks, and other areas with perennial grasses for stripe rust. Perennial grasses such as *Bromus* spp. often stay green longer than the cultivated crop and may play an important role in the 'green bridge.'
- Delay planting of winter wheat (to avoid the 'green bridge').

Fungicide Program

Apply a fungicide based on the following criteria:

- Rust on lower leaves (early rust increases potential yield loss)
- Presence of rust locally on wheat
- Susceptibility of varieties being grown
- Current and 30-day weather forecasts for mid-May to mid-June (cool, wet weather favors rust)
- Irrigated or dryland wheat (irrigated wheat is more at risk)
- Potential yield of crop should be at least 45 bu/a dryland and 75 bu/a irrigated. Alternatively, one needs a 4-5 bu yield increase to pay for the fungicide application
- Keep the flag and flag-1 leaves free of infection since they contribute significantly to yield
- Most products have a preharvest interval; check the label

Product list for Stripe, Leaf and Stem Rust, and other Leafspot Diseases:

- Quilt has proven the most effective in Montana; Tilt is marginally effective; contact fungicides such as Bravo are not effective because they do not protect the plant from subsequent infection cycles

Product	**Target diseases**	**Product rate/acre**	**Application timing**
Quilt (Syngenta)	Leaf rust Stem rust Stripe rust Tan spot Septoria glume blotch Septoria leaf blotch Powdery mildew Spot blotch Helminthosporium Leaf blight	7-14 fl oz	Up to Feekes 9 (ligule of flag leaf just visible) plant stage
Headline (BASF)	Leaf rust Stem rust Stripe rust Tan spot Septoria leaf spot Septoria glume blotch Powdery mildew Spot blotch	6-9 fl oz	Up to Feekes 10.5 (late heading emergence) plant stage
Quadris (Syngenta)	Leaf rust Stripe rust Stem rust Septoria leaf blotch Septoria glume blotch Tan spot Powdery mildew	6.2-10.8 fl oz	Feekes 6 (immediately after jointing) to 10.5 (late head emergence)

Product	Target diseases	Product rate/acre	Application timing
Stratego (Bayer)	Leaf rust Stripe rust Stem rust Septoria leaf blotch Tan spot Powdery mildew	10 oz	Feekes 8 (emerging flag leaf)
Tilt (Syngenta)	Leaf rust Stripe rust Stem rust Septoria leaf spot Septoria glume blotch Tan spot Powdery mildew	4.0 fl oz	Feekes 8 (emerging flag leaf)
PropiMax EC	Leaf rust Stripe rust Stem rust Septoria leaf spot Septoria glume blotch Tan spot Powdery mildew	4.0 fl oz	Feekes 8 (emerging flag leaf)
Manzate 75DF	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)
Dithane DF F-45 M-45 (Dow AgroSciences)	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	2.1 lb 1.6 qts 2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)
Penncozeb 80WP 75DF (Elf Atochem)	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	1.0-2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)

Rhizoctonia Root Rot/Bare Patch

Author: Mary Burrows, Ronda Koski, and Ned Tisserat

Cause

*Rhizoctonia solani (*the teliomorph is *Thanatephorus cucumeris)* a soil-inhabiting fungus

Hosts

Wheat and other members of the grass family (Poaceae). Oats are less susceptible to pathogen when compared with wheat, barley, and rye.

Occurrence

Rhizoctonia solani persists in the soil or on the soil surface for long periods of time, and is widespread.

Key Symptoms

Early-season infection:

- Localized circular areas in wheat field with stunted, dull grayish- blue or dead wheat plants.

- Infected roots typically have abnormally pointed, and sometimes discolored tips (“spear-points).

Later-season infection:

- Close examination of plants infected later in the growing season reveals characteristic oval- to lens-shaped lesions with dark brown borders and pale, “straw-colored” centers on the lower portions of wheat stems (culm) near the base of the plant. The ends of the lesions are typically pointed and stems may be girdled.
- Plants appear stunted, discolored, and may produce a “white head” of underdeveloped kernels OR exhibit delayed maturity.
- Affected wheat plants may lodge or fall over, typically at the 2nd or 3rd internode from the soil surface.
- Mycelium beneath lesions on maturing stems is often abundant and ashy-white in color.
- Leaf sheath tissue rots, leaving a characteristic, diagnostic hole rather than a fibrous net (as with Foot Rot).
- Small black sclerotia (compact masses of hardened mycelium), may develop in the space between the stem and leaf sheath.

Look-Alike Symptoms:

- *Rhizoctonia solani* girdles individual roots and rootlets, causing symptoms similar to take-all root rot, Pythium root rot, drought or nutrient deficiency.

Favorable Conditions:

- Environmental conditions, particularly cool, wet weather, significantly increase disease severity.
- Planting immediately following a glyphosate application. Glyphosate inhibits the defense system of the plant (volunteer wheat or grassy weeds), allowing it to build to large populations in the roots.
- Reduced tillage (including “no-till”) favors disease development by the increased retention of host debris and lack of soil disturbance to break hyphal networks.
- Rhizoctonia root rot is more likely to develop on plants growing in periphery of wet spots and in areas where there was standing water over the winter.

Problem

Rhizoctonia root rot can cause large yield losses of wheat, including stand reductions up to 100%. Pathogen persists in the soil, and is widespread. Primary inoculum originates from soil-borne sclerotia or from mycelium in host debris, volunteer plants or weeds. Primary inoculum originates from soil-borne sclerotia or from mycelium in host debris. Severe infections cause premature ripening and lodging of wheat plants. Root infections can occur at any time during the growing season, given favorable conditions. Pathogen populations are increased by applications of glyphosate on volunteer wheat or grassy weeds.

Management Approaches

Pay attention to the “green bridge” - the plants of volunteer cereals and grassy weeds harbor the pathogens, and assist movement of the pathogen. Wait 2-3 weeks to plant cereal crops after tillage or an herbicide (especially glyphosate) application to control volunteer cereals and grassy weeds to allow the plant material to decay.

- *Rhizoctonia solani* is active in the top 10-15 cm of soil, thus soil tillage helps to breakup pathogen mycelium and helps to promote the breakdown of infected crop residue.
- Management practices which favor good, vigorous growth of the wheat plant generally limit damage due to Rhizoctonia root rot.

- Avoid planting in wet soils or in areas where the soil will be kept overly moist during seed germination and seedling development.
- Late autumn shallow seeding of wheat tends to suppress disease development.
- Rotate wheat with legumes or other non-host crops.
- Maintain a balanced soil fertility program; research indicates that zinc helps to reduce the incidence of Rhizoctonia root rot in wheat.
- Infected winter wheat plants may be able to outgrow Rhizoctonia root rot by production of new roots.
- Effective and economical chemical controls currently do not exist for control of Rhizoctonia root rot of wheat, but some seed treatments may be partially effective.
- Resistant wheat cultivars are currently not available.

Agrichemicals Registered for Control of Rhizoctonia Root Rot / Bare Patch:

Product	**Product rate**	**Harvest restrictions**	**Efficacy**
Mono-and Dipotassium salts of Phosphorous Acid *Fosphite *Fungi-phite *Topaz	Apply as a seed treatment	Check labels for application rates and restrictions	Unknown
Triticonazole *Charter *Charter PB	2.6-3.3 fl oz/100 lbs	Check label for restrictions	Effective
Difenoconazole *Dividend XL RTA *Dividend Extreme	2-10 fl oz/100 lb seed	Barley: Do not graze until 30 days after planting Wheat: Do not graze, cut for green chop silage or hay or otherwise utilize straw until 55 days after planting	Effective
Tebuconazole *Raxil MD *Raxil MD Extra *Raxil Thiram	Raxil MD 3.5 to 4.6 fl oz/100 lb Raxil MD Extra 5 fl oz /100 lb seed Raxil Thiram 3.5 to 4.6 fl oz/100 lb seed . Other formulations, please check label specifications. Use the low rate on dryland or if rain is low. For Best results, plant no deeper than 1.5 to 2 inches.	Do not graze livestock in treated areas for 31 days.	Effective

Mountain Pine Beetle

Mountain Pine Beetles (MPB) have been impacting the west for several years now and over the past three or more years have left a very distinguishing mark in much of Montana. Over the last two years MPB have left the forests and started to impact shelterbelt and urban tree landscapes in Eastern Montana as witnessed by the infestations in Great Falls and other west slope communities.

Havre and the Hi-Line are not immune. Because of the large number of beetles that have built up and our westerly prevailing winds, the insects have successfully found their way to the Bear Paw Mountains and spilled over into Hi-Line shelterbelts and individual trees within Hill County Communities.

Mountain Pine Beetles are a native insect to our forest habitat. They generally occur in small numbers that are regulated by environmental conditions. When a shift occurs that favors the beetles there numbers can increase drastically and cause the loss of trees. The MPB is a small black beetle about the size of a grain of rice. The adult beetle usually is in flight around the end of June through September. They can be blown great distances by high winds. When they find a suitable host such as our Ponderosa Pines, Lodge Pole Pines or Scotts Pine they land and begin eating through the bark. Once successfully inside they form a vertical gallery and lay a series of eggs. Once the eggs hatch the larvae begin to feed on the cambium layer (under the bark) perpendicular to the egg chamber creating a pattern distinct to MPB. In addition to the feeding damage by the larvae, the adults often carry a fungus on their body that infests the tree. This blue stain fungus clogs the circulatory system of the tree and the tree dies. Trees that are attached by large numbers of MPB are at the greatest risk for death. If only a few beetles attack the tree, the tree's defense mechanisms my ward off the attack if the blue stain fungus does not take hold.

Protection is available for trees. There are several chemicals that can be sprayed on the trunk of the tree prior to beetle flight that are effective for protecting against MPB. Among the active ingredients are carbaryl (Sevin SL), permethrin (Astro) and bifenthrin (Onyx). Many brand names are available and the product label should be consulted for application instructions specific to MPB. These products are available from many of the local chemical dealers or professional landscape operators. Best control may come from having a custom application done to the tree if your trees are very large and you don't have proper application equipment. The application should cover the trunk of the tree from the ground up to where the taper in the main stem is down to 4-inches in diameter. Smaller trees are generally not infested because they don't have thick enough bark to allow for a successful attack, however if the beetles have nothing else to eat they may attempt an infestation. Again, the beetles attack the trunk of the tree so only the trunk needs to be treated. Any skips on the trunk could become infested. Another product known as Verbenone is also available. This product is an anti-aggregation pheromone that basically tells the beetles that the tree is fully occupied, go somewhere else. Verbenone is applied in packets stapled to the tree trunk. Flight timing is important when using this product so you can receive season long protection. They must be applied before the MPB flight occurs towards the end of June. If applied too early, they may have to be reapplied to provide end of season protection through September. For more information about Mountain Pine Beetles go to: **www.beetles.mt.gov**

Integrated Pest Management

From: Best Management Practices for Wheat, 1994

Definition: An integrated program designed to control pests using economically, ecologically, and environmentally sound management practices.

Purpose: To identify, select, and integrate several methods of pest control. To maximize profits, pest control effectiveness, and applicator safety while minimizing exposure of pesticides to ground and surface water resources.

Principles and Strategies Involved: Integrated Pest Management (IPM) can reduce the amount of pesticide **available** for loss by making the most efficient use of pesticides. Efficiency is enhanced by the use of a wide range of pest control measures and by making any necessary pesticide applications at the optimum time.

How Integrated Pest Management Programs Work:
IPM strategies are highly localized. The Cooperative Extension offices in every state have wheat pest management guidelines applicable to local conditions. There are, however, some key components common to most IPM strategies. A rigorous **scouting** schedule for pests in each field is essential. Scouting a field in an "X" or "Z" pattern will provide a good representative sample. **Record keeping** provides the necessary cropping history and up-to-date field and pest information. **Economic thresholds** recognize the point at which a control strategy is initiated to avoid economic loss. IPM requires a **knowledge of pests** and susceptibility of varieties to those pests. **Climatological data** can provide information on the development of pests and the wheat crop, which affects control decisions.

A variety of strategies should be integrated, including: selection of resistant varieties; cultural practices such as crop rotation, healthy seed, seeding date selection, nutrient management practices, tillage, harvest management, and post harvest weed control; biological pest control; and chemical control, including the use of seed treatments and pesticides.

Where integrated pest management programs work best:
Can work for all wheat fields, but works best where pest thresholds and cropping histories are known, and where up-to-date field information is available.

Some common components of and Integrated Pest Management program for wheat:

- **Scouting**
- **Record keeping**
- **Economic thresholds of pests**
- **Accurate pest identification**
- **Resistant varieties**
- **Crop rotations**
- **Good fertility management**
- **Healthy seed**
- **Seeding date**
- **Seed treatments**
- **Biological controls**
- **Harvest management**
- **Spot treatments of pesticides**
- **Band applications of pesticides**
- **Sprayer maintenance and calibration**

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