

Montana IPM Bulletin



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Bed Bugs and Pesticides around the Home

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Bed bugs have made headlines across the United States in recent months, with insects turning up in hotels, college dorms, airports, and our homes. The New York City health department reported 6.7% of all New York City residents requiring an exterminator for bed bugs from 2009-2010. Even though bed bugs have made recent headlines, they are not a new pest for humans. Fossilized remains of bed bugs in an Egyptian village were found to be over 3,500 years old. It is theorized that DDT and other pesticides classified as chlorinated hydrocarbons and organophosphates managed these pests effectively from the end of World War II until the mid 1990's. DDT lost all registrations in the U.S. in 1972, while still other organophosphate chemistries, including malathion, lost registrations in the home since the 1990's.

Some concerned homeowners trying to protect their children from bedbugs may inadvertently place their children or themselves at risk. Homeowners should NEVER apply pesticides which are not specifically labeled for bed bugs in the home. The misuse of some organophosphate or carbamate pesticides may cause allergies, asthma, immune system hyper-sensitivity, nausea, convulsions, or death. A recent study published by

Environmental Health Perspectives also found an association between increased exposure to organophosphates and increased ADHD symptoms in children. Homeowners wishing to manage bed bugs should follow a multi-dimensional approach which includes identification, prevention, sanitation, removing access points and the use of only select pesticides which are labeled for bed bug control in the home.

Identification and Life Cycle

Bed bugs are a brownish-red, oval, flattened insect that is 1/4" – 3/8" long. Some humans are not aware of being bitten, while others have an allergic reaction to the saliva injected by the bed bug. Bed bugs leave the host to digest the blood meal for several days prior to depositing from 10 – 50 whitish eggs.

The average life span of a bed bug is 10 months to a year, with females depositing from 200-400 eggs in their lifetime. This may lead to heavy infestations over short periods of time. Heavy infestations can cause anemia in children and the elderly, and lead to sleeplessness and stress in the home.

Prevention

Be wary of bringing infested items into your home. Bed bug infestations are more common in other urban areas of the United States when compared to Montana. It is possible to carry bed bugs home in your luggage from your vacation. Inspect all clothing and baggage for fecal spots prior to unpacking.

Inspect all crevices and gaps within bedrooms for insects, cast skins, and eggs. Check pillowcases, sheets, and mattresses for blood and fecal stains. High populations have been noted to smell like raspberries.

Seal all crevices, which are shelter for bed bugs. Caulk will work around windows and



(UNIVERSITY OF FLORIDA IFAS EXTENSION, 2006)



baseboards. Tighten up any loose electrical outlets, while repairing wallpaper, which also is shelter for bed bugs.

Sanitation

Sanitation includes vacuuming in addition to cleaning bed linens, clothes, and mattresses. To optimize management of bed bugs vacuum every day, and remove vacuum bag immediately. Vacuum bags may be placed in freezer for 24 hours before disposal.

Bed bugs are extremely vulnerable to high temperatures (>140 degrees F.). Bed linens and clothes can be placed into a hot dryer for 20 minutes to kill bed bugs. Steam cleaning at a high temperature also is an effective management option.

Mattresses can be scrubbed with a hard bristle brush to remove eggs. Mattresses with entry holes often are harboring bed bugs within. In those instances mattresses should either be enclosed in a zippered mattress cover or discarded.

Removing Access Points

Bed bugs cannot fly so they must access the bed by crawling. Beds should be carefully examined to remove all access points from the floor where bed bugs often originate. Follow this checklist:

- Move your bed from the wall
- Make sure linens and blankets don't touch the floor.
- You may wish to smear petroleum jelly on bed legs to inhibit insects.

Pesticides

Several types of pesticides are available for use in the home for bed bug control. These insecticides (usually pyrethroids) are applied as spot treatments to crevices where bed bugs are hiding. Reapplication of pesticides is often necessary.

The pesticide product should be labeled for bed bug management within the home. Very few pesticides are labeled for use on mattresses and there are not any pesticides labeled for use on beddings or linens. Care should be taken to remove occupants until well after the restricted entry interval (REI) has passed on the pesticide product label, while not using pesticides in rooms which are occupied by infants, sick, or the elderly.

Plant Disease Management in Montana

Mary Burrows, MSU Plant Pathologist

Each year, plant diseases reduce the yield and quality of crops. They tend to be more severe when there is adequate moisture for crop yields. For example, this spring we had above average moisture across the state and cool temperatures for an extended period. This caused widespread root rot from soilborne Pythium, Rhizoctonia, and Fusarium in small grains and legumes. As we near harvest, we're starting to see take-all and Fusarium crown rot causing white heads. This time of year I start getting calls about crops that didn't yield as much as expected given the moisture situation. It's very difficult to tell if the observed lack of yield was due to root rots early in the season, since the roots have already rotted away. My assessment of the involvement of crown rot is based on the sample submitted to the diagnostic lab. Many other factors such as mis-timed herbicide applications or inadequate fertilizer for the expected yields can also be contributors. To complicate matters, some soilborne and stubble-borne diseases are exacerbated

by high nitrogen levels that create a more lush, disease-susceptible plant.

It's frustrating to confront many soilborne diseases because, apart from standard good practices such as using a fungicide seed treatment, planting at an appropriate depth, avoiding the green bridge and using the best-adapted variety for your area, there is little you can do. These diseases tend to increase under no-till management due to the lack of soil disturbance and cooler soils at planting. Crop rotation is of limited efficacy since the fungi have a very broad host range. There is limited variety tolerance or resistance to soilborne pathogens; it is a very difficult trait to breed for and there is a wide diversity in the 'strains' of fungi causing disease across the state.

Adequate moisture also increases the occurrence of leaf spotting diseases such as Septoria leaf spot, tan spot, net blotch, scald, and Ascochyta blight, among others. Management of these diseases will vary by the crop and variety, and there are

Get Ready for Fall Weed Control

Fabian Menalled, MSU Crop Weeds Specialist

As fall temperatures cool, growers across the region have an opportunity to control winter annual and perennial weeds. Understanding how weeds grow, and learning key control concepts will enhance producers' ability to reduce the spread and impact of weeds this fall. This article provides tips to manage winter annual weeds in small grain farming systems and reviews several concepts for managing perennial broadleaf weeds.

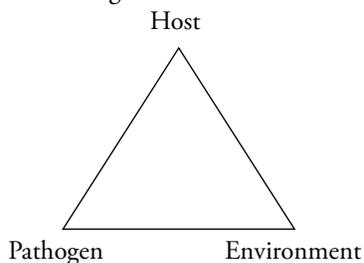
As a general rule, winter annual species germinate from late summer to early winter, overwinter as seedlings, grow rapidly as temperatures warm in the spring, and then flower, set seed and mature by early summer. These seeds lie dormant in the soil during the rest of the summer months.

With more and more no-tillage acres planted with winter wheat, farmers across the region are seeing an increase in the abundance of winter annual weeds such as cheatgrass, jointed goatgrass, field pennycress, wild mustard, shepherd's purse, catchweed bedstraw, common chickweed and prickly lettuce. Generally, the best time to manage winter annual weeds is in the fall, and earlier is best. Timing of herbicide applications in the fall is critical for maximum effectiveness. As a rule, treatments need to be made before the first killing frost.

Herbicides such as Stinger, WideMatch, Maverick, Olympus, and Osprey can be used to control winter annuals in the fall. However, rotational crop restrictions vary between herbicides and producers should

many publications to assist you in making the decision about when, whether, and how to manage them. A rule of thumb is to scout for leaf spotting diseases when there are 6-12 hours of leaf wetness and daytime temperatures above 55F. These diseases require adequate moisture and some heat. This spring I expected to see lots of stripe rust. I knew it was occurring in neighboring states and blowing in on weather systems. However, the pathogen prefers temperatures of 50-64F to infect and sporulate (the newer strains prefer the higher temperatures), and although this is one of my keystone 'cool season' diseases, it was too cold for stripe rust to develop. Also, growers have transitioned to less susceptible varieties such as Yellowstone, which will limit disease development across the state. I am seeing wheat samples coming in this fall with stripe rust, which could set us up for a big epidemic next year if it survives the winter. Plant resistant varieties, avoid the green bridge, and watch your crop next spring. This is a lesson in the importance of the disease triangle: to have a 'successful' disease, you need a susceptible host, a pathogen, and a conducive environment. Remove any one of these corners of the triangle and disease does not occur.

The disease triangle:



There are many diseases ubiquitous in our environment, whereas others blow in from other regions or come in on seed. These can be devastating, and the grower needs to be on the lookout for and prepared to treat if needed. A good way to keep up-to-date on disease occurrence and what may be happening in your area is to subscribe to AgAlerts. These are short pest management alerts, which are highly relevant to most Montana growers, and have clear descriptions so they can be deleted if they do not pertain to you. To sign up to receive

alerts by email, go to www.mtagalert.org/ and enter your email address. To sign up for faxed AgAlerts: fax, email, or call Mary Burrows (fax 406-994-7600; email mburrows@montana.edu; phone 406-994-7766) and leave your fax machine on during the growing season. And, **if you see a disease out there in the state, call me or your county Extension agent.** Much of the material for AgAlerts results from discussions with county agents, crop consultants, and other ag professionals.

You can submit a sample to the diagnostic lab for identification through your county Extension office; for instructions and forms visit <http://diagnostics.montana.edu>. We identify plant diseases, insects, and also perform plant identifications – this service is currently free in Montana, although we reserve the right to charge for specialized tests.



(LEFT: SPEAR TIPPING CAUSED BY RHIZOCTONIA ROOT ROT, ALSO KNOWN AS BARE PATCH; RIGHT: SHINY BLACK DISCOLORATION CAUSED BY TAKE-ALL CROWN ROT)

carefully read the specific restriction of the product they plan to use. This is particularly important in diversified rotations that include pulse crops such as lentils, peas, or chickpeas, as several small grain herbicides have restrictions of up to 36 months.

Fall also provides an excellent opportunity to control several problematic perennial broadleaf species. Cooler temperatures trigger the movement of food reserves down to the root systems, enhancing the movement of herbicides to the plant's root system and improving control. However, perennial weeds vary in their sensitivity to frost, and the application window differs between species. For example, Canada thistle can survive light frosts and is effectively controlled with relatively late fall herbicide applications. Other perennial weeds such as hemp dogbane and common milkweed complete their life cycles by late summer and do not tolerate frost well, so fall herbicide applications should not be

delayed when controlling these species. Finally, although fall application will not guarantee excellent control of field bindweed, late control practices can be quite effective provided there is re-growth of this weed.

Regardless if a producer is targeting a winter annual or a perennial weed, it is important to know that if plants are stressed from drought or cold temperatures, applications will not provide satisfactory control due to poor movement of herbicide through the weed. To secure active translocation, fall herbicides should be applied when temperature are expected to exceed 60-65 Fahrenheit during the day. Fall applications should be made only if plants still have green and pliable leaf tissue. As a rule of thumb, do not expect satisfactory control if less than 60 percent of the original leaf tissue remains.

The adoption of no-tillage systems has increased our reliance on herbicides. While

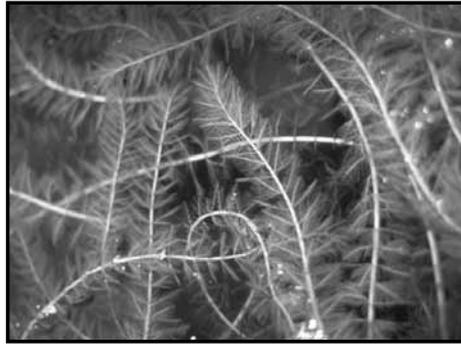
this approach to farming has benefits in terms of reducing soil erosion and energy use, it increases the potential for selecting herbicide resistant weeds. The use of herbicides with different modes of action applied as tank mixes, premix formulations, or sequential applications can help in managing resistance.

Fall provides a great opportunity to clean up troublesome winter annual and perennial weeds. To secure success, scout your fields, identify plants that are still green and growing, make note of their growth stage, and select the best product that fits your crop rotation sequence.

Disclosure: Common chemical and trade names are used in this publication for clarity by the reader. Inclusion of a common chemical or trade name does not imply endorsement of that particular product or brand of herbicide and exclusion does not imply non-approval.

Aquatic Invasive Plants on the Rise

Jane Mangold, MSU Invasive Plant Specialist



(LEFT: CURLYLEAF PONDWEED, BOZEMAN, MONTANA. RIGHT: EURASIAN WATERMILFOIL. PHOTO COURTESY OF ALLISON FOX, UNIVERSITY OF FLORIDA).

Montanans have been battling terrestrial invasive plants for decades, and have historically led the region in developing and implementing comprehensive, integrated invasive plant management programs. More recently aquatic invasive plants have received increased attention, and for good reason.

Aquatic invasive plants threaten agricultural and ecological systems by reducing water flow and even clogging streams, lakes, ponds, ditches and irrigation canals; displacing native aquatic vegetation; reducing dissolved oxygen levels while increasing nutrient levels; reducing water accessibility for humans, livestock, and wildlife; and impacting recreational activities like fishing, boating, and swimming. Often there are few, if any, acceptable controls available for use in natural water bodies once aquatic invasive plants become established. Control efforts are typically very expensive, and total eradication is very unlikely.

Aquatic invasive plants on Montana's radar include Eurasian watermilfoil (*Myriophyllum spicatum*), curly-leaf pondweed (*Potamogeton crispus*), flowering rush (*Butomus umbellatus*), and hydrilla (*Hydrilla verticillata*). The first three of these are state-listed noxious weeds, while hydrilla is a regulated plant. Other species on the state noxious weed list that thrive in riparian systems include purple loosestrife (*Lythrum* spp.), yellowflag iris (*Iris pseudocorus*), and saltcedar (*Tamarix* spp.).

During summer 2010 new infestations of curly-leaf pondweed and Eurasian watermilfoil were reported in Montana. In

July curly-leaf pondweed was found in ponds along the East Gallatin River system north of Bozeman. While current distribution records indicate curly-leaf pondweed is present in Flathead, Lake, Lewis & Clark, Sanders, and Valley Counties, it is probably more widely distributed across the state. Curly-leaf pondweed prefers shallow water depths with a silty, high nutrient bottom. It is distinguished from native pondweeds by its growth habit and very distinctive leaf edges. Unlike native pondweeds, it actively grows throughout the winter, with new plants emerging in the spring. The leaves of this species have wavy edges resembling lasagna noodles. They are typically about 1 to 3 inches long, narrow, reddish in color, and translucent, with the flattened stems visible through the leaves. Curly-leaf pondweed usually spreads by winter buds called turions and vegetatively as small fragments of plant material attached to waterfowl, boats and other equipment.

Eurasian watermilfoil, one of the most widely distributed of all aquatic invasive plants in the U.S., was first found in Montana in July 2007 in Noxon Reservoir in northwestern Montana. Inventory data collected in 2008 found it in 247 acres in Noxon Reservoir and 117 acres in Cabinet Gorge. In early August 2010 it was reported in two different areas of the Missouri River: 1) in and upstream of Toston Reservoir in southwestern Montana and 2) near the Fort Peck Dredge Cuts in northeastern Montana. Surveys are ongoing to determine the extent of its presence in the Missouri River system. Eurasian watermilfoil is a submersed, aquatic perennial that

tolerates a wide range of sediment types. The fibrous roots are slender and fragile, and leaves are whorled in groups of four. They have 14 to 24 pairs of thread-like divisions giving the leaf a feather-like appearance. Stems can grow up to 21 feet to the water surface, where they branch profusely. Pink flowers form on two to eight inch spikes at the ends of the stem branch. At the time of flowering, the spike is erect, but bends at fruit set to be parallel to the water surface. Eurasian watermilfoil can be easily confused with two native species, shortspike watermilfoil and whorl-leaf (also known as western) watermilfoil.

Control of aquatic invasive plants usually takes the form of some type of mechanical harvest, bottom barriers to prevent rooting, chemical control using an approved aquatic herbicide, or water level drawdown. In Montana, applicators need a 308 permit from the Montana Department of Environmental Quality before applying aquatic herbicides to water.

Montana is in the fortunate position to prevent the widespread establishment of most aquatic invasive plants, because the presence of these species is limited across the state or the weeds are common in isolated areas only. Preventing spread and introduction into non-infested waters can be accomplished by inspecting, cleaning, and drying any recreational gear (e.g. boats, trailers, fishing boots and waders) when moving from one body of water to the next. Other preventative actions include responsible use and disposal of water garden and aquarium plants, maintaining healthy native aquatic vegetation, and learning to identify aquatic invasive plants so that infestations can be detected early and promptly controlled.

If you think you have found curly-leaf pondweed, Eurasian watermilfoil, or any other aquatic invasive plant, contact your county Extension agent or weed district for more information. It is critical to detect and report these species so that we can keep Montana waters weed-free.

Wireworms: An Increasing Threat to Sustainable Agriculture in the Northern Great Plains?

Kevin Wanner, MSU Cropland Entomologist

When I first arrived in Montana during the summer of 2008 I was immediately called to Pondera County to inspect wheat and barley fields damaged by wireworms. Producers and consultants in the area believed that wireworm damage was getting worse. In 2009 we began conducting seed treatment trials, and as I presented talks across the state I was approached and told “Oh, wireworms, we have lots of those here too!” An average of 1-2 wireworms per bait station is considered the threshold for treatment, bait stations in fields that we surveyed caught 2-8 wireworms on average, with some traps catching as many as 65. While not necessarily alarmed, I have become concerned enough to focus field research studies for the next five years towards addressing this growing insect pest problem.

The Problem

Wireworms are the larval stage of click beetles (Family Elateridae). The larvae live in the soil and are serious pests of small grain, corn, sugar beet and potato crops globally. The biology of the larval stage of most click beetle species is not known because many species require 2-5 years in the soil before developing to adults. Since the 1950s conventional insecticides such as lindane provided effective and inexpensive protection from wireworms, and little integrated pest management (IPM) research was conducted. The recent removal of these products from the agricultural market, particularly lindane, has resulted in increasing levels of wireworm damage. No till sustainable agricultural practices have created favorable soil conditions for wireworms to survive. A thick duff layer provides cooler temperatures and wireworms remain at the soil surface for longer periods, feeding on the germinating seeds and developing plants. Research is needed to counteract the loss of these insecticides, but insect identification, one cornerstone of IPM, is difficult in this group. In most cases wireworms occur in complexes of several species, and the efficacy of IPM tactics cannot be evaluated between the

different species without larval identification keys. The fact that not all insect species are equally susceptible to chemical, biological and cultural control tactics is well documented. In fact, toxicities of different insecticides may differ between wireworm species. However, the damaging stage is the larva, and because the vast majority of species can only be identified using adult males, there may be a large underestimation of the pest diversity involved.

Developing Identification Tools

About 9,300 species of click beetles have been described worldwide. In North America 885 species have been identified. Dr. Mike Ivie is an entomologist and beetle taxonomist at Montana State University. More than 15 years ago a graduate student working with Dr. Ivie collected and identified more than 150 click beetle species in Montana. These beetles are stored in the Montana Entomology Collection at MSU. However, they have never been linked to the larval stages that are infesting Montana’s cropland. With support from the Montana Wheat and Barely Committee, we began collecting wireworms from Montana’s cropland during the 2010 field season. More than 2000 wireworms were collected from a field near Denton, and 600 from a field near Conrad, on six different dates spanning the growing season. We are using DNA barcoding technology to match the larval species collected from the fields to the adult species in the MSU collection. A small region of the insect’s DNA is sequenced (the barcode) and it is matched to the corresponding adult’s barcode (the DNA barcodes are unique for each species, but there are no differences between the larval and adult stages). The goal is to identify the complex of different wireworm species infesting Montana’s cropland and to develop tools for identifying the larvae to species, a project that will be funded by a USDA Crops at Risk (CAR) grant for the next three years.

Future Research

Now that we have started on the first critical step, learning to identify the damaging larval stages to species, we are developing future research objectives to improve tools for managing the damage they cause. First, we are conducting field trials to evaluate the effectiveness of currently available seed treatments to provide science-based guidelines for their use to control wireworm damage in wheat and barley. Second, we are supporting efforts by the ag industry to develop new and more effective seed treatments that specifically target wireworms. Third, we are beginning to investigate the use of alternative natural biological control agents to curb wireworm populations in the soil.



WIREWORM FEEDING INSIDE SPRING WHEAT STEM. PHOTO COURTESY OF KEVIN WANNER, 2010

Papers to Ponder

Century-old mystery of *Puccinia striiformis* life history solved with the identification of *Berberis* as an alternate host.

Do you remember the barberry eradication program (1918-1975)? This was initiated after the severe stem rust epidemics in 1916 during WWI. Well, not only can barberry provide the alternate host for stem rust, researchers have now found it's the alternate host for stripe rust. This is important because the rusts can sexually recombine on their alternate host and generate new strains that overcome currently deployed resistance genes. Our own domestic rust is Ug99s.

Jin, Y., Szabo, L. J., and Carson, M. 2010. *Phytopathology* 100:432-435. <http://apsjournals.apsnet.org/doi/pdf/10.1094/PHYTO-100-5-0432> (Burrows)

Farmer, agent, and specialist perspectives for learning among today's farmers.

Most educators prefer to teach the way they prefer to learn. For most Extension specialists, that means we like to do hands-on and interactive activities. Unfortunately the meeting venue is not always conducive to demonstrations and hands-on activities or one-on-one conversations. As you sit in one of the fall pest management meetings, listening to Powerpoint presentations or participating in an interactive activity, think about how your educational experience could be improved and give specific feedback to the presenters. Did you learn the material they were trying to teach, was it relevant to your situation, and will you apply it on your farm? If it was relevant but you don't feel like you have a good grasp on the content, how could the presenter have changed the method of delivery, given the size of the audience and the location of the presentation, to make it a better learning experience? We really need this feedback if we're going to improve our delivery methods, and it helps to know (if) you want to learn what we have to teach. And of course, we are always learning from you!

Franz, N., Piercy, F., Donaldson, J., Westbrook, J., and Richard, R. 2010. *Journal of Extension*. 48(3): 3RIB1. www.joe.org/joe/2010june/pdf/JOE_v48_3rb1.pdf

Trained dogs outperform human surveyors in the detection of rare spotted knapweed (*Centaurea stoebe*).

This study investigated and compared the performance of trained dogs and human surveyors to find rare spotted knapweed infestations. Detection dogs were found to be as accurate as humans at identifying large-size spotted knapweed infestations (0.5m³) and more accurate than humans with medium infestations (0.13 m³). Dog accuracy was much better than humans with small infestations (individual plants), and dogs were able to identify small infestations from greater distances than humans. The authors conclude that detection dogs can contribute to effective search protocols by thoroughly covering large areas and increasing the probability that small and inconspicuous plants will be found.

Goodwin, K.M., R.E. Engle, and D.K. Weaver. 2010. *Invasive Plant Science and Management* 3:113-121.

Predicting plant invasions in an era of global change.

This paper evaluates the potential relationship between plant invasions and global climate change. Whereas some components of global change, such as rising CO₂, usually promote invasion, other components, such as changing temperature and precipitation, can help or hinder plant invasion. Intrinsic variability and unpredictability of plant responses to global change makes invasion forecasts difficult. Managers should be prepared for both expansion and contraction of invasive plants due to global change, leading to increased risk or unprecedented opportunities for restoration.

Bradley, B.A., D.M. Blumenthal, D.S. Wilcove, and L.H. Ziska. 2010. *Trends in Ecology and Evolution* 25: 310-318.

Organophosphate pesticide exposure and attention in young Mexican- American Children.

In utero exposure to organophosphate (OP) pesticides, well-known neurotoxicants, has been associated with neurobehavioral deficits in children.

Marks A.R., Harley K., Bradman A., Kogut K., Barr D.B., Johnson C., et al. 2010. *Environmental Health Perspectives*:-. doi:10.1289/ehp.1002056.

Oviposition behavior of the wheat stem sawfly when encountering plants infested with cryptic conspecifics.

Some insects will avoid laying eggs in host plants that have already been attacked, to avoid competition. In this study the authors found that female sawflies did not avoid laying eggs in wheat stems that were already infested, they showed no egg laying preference based on infestation. These results support the development of trap crops for managing sawfly damage, as trap crops become infested, they should not become less attractive, and they should be capable of trapping high densities.

Buteler, M., Weaver, D.K., and R.K.D. Peterson. 2009. *Environmental Entomology* 38(6):1707-1715.



Ask the Expert

Q: There is mold growing in my hay – should I be concerned about feeding this to cattle?

A: Fungi which can produce poisonous chemicals called ‘mycotoxins’ grow in hay and other feed plants including corn, peas, wheat and barley when there is sufficient moisture for growth. The most common mycotoxins are produced by fungi in the genera *Aspergillus*, *Penicillium* and *Fusarium*, however other fungi can also produce mycotoxins. One of these is ergot, which replaces seed in the head with hard, black fungal structures called sclerotia. Some molds may cause a reduction in feed intake at low doses. In higher doses, mycotoxins can cause death or ill health typically characterized by symptoms including convulsions, gangrene, hyperthermia (increased body temperature), agalactia (no milk), lack of mammary gland development, prolonged gestational times, and early calf/foal death. The type and severity of symptoms will depend on the type of poison consumed, the frequency and quantity of ingestion, the condition of the animal, etc. For diagnosis, please contact your local veterinary professional.

The Schutter diagnostic laboratory can test hay, silage, or grain for mycotoxigenic fungi but we cannot test for the mycotoxins themselves. You can submit samples to the North Dakota State University Veterinary Diagnostic Laboratory (www.vdl.ndsu.edu/; (701) 231-7527 or (701) 231-8307). Call them for specific instructions on material to submit and for information on fees. More information can be found in MSU Extension publication SKU EB0174 ‘Mycotoxins and Mycotoxicoses.’

Q: How can I control scattered spotted knapweed plants with minimal damage to native plants?

A: Hand-pulling spotted knapweed works very well on small acreages. Spotted knapweed is taprooted and pulls fairly easily (especially in wet soil) or can be dug with a spade or shovel. If the spotted knapweed is flowering, be sure to bag, seal and dispose of plants or burn the plants to prevent seed production. On larger acreages and

denser infestations, spot spraying with an appropriate herbicide will allow you to target knapweed while causing minimal injury to other plants. Spotted knapweed may still be green and photosynthetically active in the fall when many native plants have senesced for the season, which further reduces the potential for damage to non-target species. Be sure to wear appropriate protective equipment when handling spotted knapweed and/or herbicides.

Q: I bought too much herbicide. Any tips on storing it?

A: Proper herbicide storage is essential to protect people, animals and the environment from accidental exposure. It is also essential to protect herbicides from extreme temperatures that may degrade them. Here are some tips:

The simplest thing you can do is to check the label. Herbicide labels have valuable information on storage needs.

Carefully select a storage place where flooding and fire are unlikely. This site should be located far away from any water body or well and should be located downwind and downhill from sensitive areas such as houses, gardens and playgrounds.

The storage facility should have a curbed impermeable floor, such as concrete, to eliminate the risk of pesticide leaks or spills leaching into the unprotected ground.

Signs or labels should be posted on the outside of the building. Maintain, in a separate location, a list of the chemicals and amounts stored.

Dry products should be located above liquids to prevent wetting from spills. Check herbicide containers for cracks, tears or leaks that may occur during cold weather. Also make sure they are sealed tightly.

When the winter is over, herbicides should be checked before they are used. Liquid products that have become separated, crystallized or coagulated should be placed in a warm area (about 70 degrees F) for several days, during which the containers should be inverted or shaken periodically. Usually, warm temperatures and agitation are enough

to re-dissolve the crystals into the solvent. If the solution does not re-dissolve, it probably should not be used.

Q: Am I legally responsible for killing honeybees that migrate from my neighbor’s property to blooms on my property?

A: Yes. You are legally responsible for using pesticides to kill bees, even if they have migrated from your neighbor’s property. This can include replacing your neighbor’s entire bee colony, or compensation for economic losses as well as a fine. Many pesticide products have environmental hazard statements which warn of the dangers of applying pesticides near pollinators. Applicators may avoid injuring local bee colonies by applying many permethrin or pyrethroid insecticides when bees are inactive (in early morning or late evening). Care should be taken not to apply these pesticides when a heavy dew exists as pesticide will remain toxic towards bees until dew has dried from the field.



Pest Management Tool-kit

Urban IPM Workshop: The MSU Urban IPM Program is sponsoring a workshop, “Pesticides for the Home Landscape: What, When and How,” for landscape professionals on Sunday, January 23, 2011, at Fairmont Hot Springs. We will concentrate on what pesticides are available for residential yards and gardens, where and when they should be applied, and pesticide safety. Continuing education credits will be offered for Montana Pesticide applicator licenses (O&T), Urban IPM certification and International Society of Arboriculture. Check our website for information (www.msuextension.org/urbanipm/). Information requests can be sent to urbanipm@montana.edu.

Common Wheat Pests in Montana calendar, 2011: The ‘Common Wheat Pests in Montana’ calendar has been updated and re-printed for 2011 with funding from the Montana Wheat and Barley Committee. Get a copy at your Extension office, various meetings throughout the state, or online at www.msuextension.org/plantpath/. This year’s calendar has information on rusts, leaf spots, viruses, and crown rots; prickly lettuce, cheatgrass, foxtail barley, and jointed goatgrass; grasshoppers, cutworms, wheat stem sawfly and the orange wheat blossom midge. There are also chemical recommendations, information on parasitoids

for wheat stem sawfly control, and new fact sheets on orange wheat blossom midge and prevention and management of herbicide resistant weeds. There are monthly notes about timing of pest monitoring and management to remind you of what to pay attention to in spring, summer, and fall. There are also web links to further information on each pest. It’s a great resource and attractive too!

Second Invasive Species in Natural Areas Conference, October 25-29, Coeur d’Alene, Idaho: www.nripc.org/conferences.html. Several days devoted to biology, ecology, and management of invasive plants in the northern Rocky Mountain region. Hosted by the Northern Rockies Invasive Plants Council.

Montana Weed Control Annual Conference, January 11-13, Great Falls, Montana: www.mtweed.org/mwca-conference-information/. A great opportunity to learn about what’s going on with noxious weeds across Montana. Agenda includes information on noxious weed and native plant identification, revegetation, applied research, funding opportunities, educational ideas, recreation and weeds, and aquatic invasive plants.

Society for Range Management 64th Annual Meeting, February 6-10, Billings, Montana: www.rangelands.org/billings2011/

MSU Weed and Invasive Plant Ecology and Management Group website: weedeco.msu.montana.edu/. A newly designed website with links to our agricultural, rangeland, and wildland research and Extension activities.

MSU Towne’s Harvest Garden website: www.townesharvest.montana.edu. MSU’s student run Community Support Agriculture. Find information on newly developed Sustainable Food and Bioenergy Systems programs and recipes to cook locally produced food.



Roundup

Diagnostic lab summary

Skoglund, Burrows, Graves, O'Neil

Schutter Diagnostic Lab had a busy season. Plant disease diagnostics staff (Linnea Skoglund, general; Mary Burrows, small grains and field crops; and Melissa Graves, herbicide injuries) were particularly busy with a total of 739 samples processed since May 1 compared to 588 for the same period in 2009. About 30% of samples were woody ornamentals and 15% were small grains, 14% vegetables and 12% field crops. Additional diagnostics help came from Jack Riesselman, Barry Jacobsen and Cathy Cripps. Students Jackie Campbell and Laurie Neuman were a great help.

It has been a very hard year for woody ornamentals. The widespread freezing temperatures in early October 2009 were devastating to trees. Green ash seemed to be the most affected followed by maples and aspen. Many did not put on a single leaf. Others had sprouts on trunks or a single branch with leaves. Now in August, many of those trees that put on leaves are showing early fall color and are dropping leaves, especially maple. It is unknown how any of these trees will perform next year. On top of all this, the foliar diseases and shoot blights were rampant with the cool wet weather. However, the cool temperatures helped reduce fire blight.

Meanwhile, conifers were severely hit by weather (the same freeze), diseases and insects. Austrian pines were especially hard hit. Pine wilt nematode was discovered for the first time in Billings and a possible canker disease is killing weather-damaged trees. Spruce trees are showing delayed effects of freeze damage and have insect problems.

Herbicide contaminations continue to plague home gardeners, with 38 samples exhibiting herbicide injury symptoms. This issue continues to be a problem across Montana. We urge everyone to obtain compost/manure from well-documented, reputable sources. Additionally, garden soils, compost, and manure should be tested using

the bioassay test available in the winter edition of the Montana Pesticide Bulletin to verify that planting materials are safe.

Weed identification samples were up from last year. A total of 275 samples have been processed since May 1 compared with 243 samples for the same time period last year. Several county record noxious weeds have been received and reported including curlyleaf pondweed and yellow starthistle for Gallatin County.

Arthropod samples were also up, with 600 identification made so far this year, compared with 408 at this time last year. Grasshoppers were not unusually abundant this year, in spite of predictions for high numbers, perhaps due to the prolonged cool spring weather. Some soil insect larvae, like March flies and subterranean termites, were more abundant this year.



JAN SAMANEK, STATE PHYTOSANITARY ADMINISTRATION, BUGWOOD.ORG

Black Henbane

Mangold

Black henbane (*Hyoscyamus niger*) thrived during summer 2010. Black henbane is an annual or biennial of the nightshade family (Solanaceae). It has large, soft, grayish-green leaves that are covered with fine, sticky hairs. Black henbane grows from 1 to 6 feet tall, has a whitish fleshy taproot, and 5-lobed, funnel-shaped flowers that are brownish-yellow with dark purple veins. Pineapple-shaped fruits appear after flowering, and each fruit capsule contains black, pitted seeds. Black henbane produces 10,000 to 500,000 seeds per plant and reproduces by seed only. Black henbane is common in disturbed rangeland and

pastures, along fencerows, roadsides, riparian areas and waste areas. Its growth is enhanced by increased levels of soil nitrogen. All parts of the plant are poisonous to humans and livestock, however the plant has a long history of medicinal use. For more information, download or request a printed copy of the new MontGuide "Black Henbane: Biology, Ecology and Integrated Management," publication MT201005AG, at www.msuextension.org/store/.

Small grain herbicide update

Menalled

This year, several new small grain herbicides were released. The general trend is to combine various existing compounds to produce wide spectrum control and herbicide resistant management. While a complete revision of all these products is beyond the scope of this review, here is a brief summary of a few of them:

Pulsar (dicamba plus fluroxypyr) has been released for use in winter wheat, spring wheat, durum wheat, and barley. Pulsar is a combination of two active ingredients within the Group 4 (synthetic auxins) chemicals. It provides broadleaf weed control and can be used to manage ALS-resistant kochia in Montana.

In spring 2010, Supremacy (fluroxypyr, thifensulfuron and tribenuron) registration was approved. This herbicide provides broad spectrum control of broadleaf weeds including ALS-resistant biotypes.

Everest KO (flucarbazone and fluroxypyr) provides grass and broadleaf weed control including both ALS-resistant kochia and ACCase-resistant wild oats and green foxtail in spring and winter wheat.

Cheatgrass can increase disease spread

Menalled

While weeds can reduce crop yields through resource competition, they can also impact crops by acting as a reservoir for pathogens and facilitating disease

spread. This summer, we observed that cheatgrass infestations are highly associated with increases in winter wheat mortality due to pink snow mold (*Microdochium nivale*). In experimental plots planted with winter wheat and cheatgrass, we observed high levels of winterkill. We isolated pink snow mold from dead and dying plants and noticed that cheatgrass fall seedling densities were positively correlated with frequency of winterkill. This is the first time the interaction between cheatgrass, wheat, and pink snow mold has been reported. Our results suggest that reducing cheatgrass seedling densities in the fall may be an effective way to control the spread and impact of wheat diseases.



WWW.EXPONET.COM

Maneb Registration Cancellation

Tharp

Growers should have used up all existing stocks of 'maneb.' This is because of EPA's 'tolerance revocation' of maneb, which took place on July 26, 2010.

More details of this tolerance revocation can be viewed at www.pesticides.montana.edu/News/Miscellaneous/maneb%20proposed%20tolerance%20revocation.pdf.

See more details of an earlier MSU news alert regarding cancelation of maneb registrations at 'www.pesticides.montana.edu/News/Miscellaneous/manebagalert.pdf'.

Contact the MSU Pesticide Education Program (Cecil Tharp, ctsharp@montana.edu, (406)994-5067) or see the complete tolerance revocation document online at maneb tolerance revocation.

Insects

Wanner

As the growing season got underway, grasshopper populations were expected to reach levels not seen since the last major regional outbreak during the mid to late 1980's. However, the cool wet spring slowed grasshopper development and reduced damage. Egg hatches were delayed and the extra rain provided grassland the ability to recover from damage. This is not to say there was no economic damage, there were plenty of hotspots, but statewide it could have been much worse. By August many grasshoppers still had not developed to the adult stage. This may result in fewer females laying eggs at the end of this summer, curbing their population growth next spring. However, the number of hatching nymphs next spring will be the best measure of how the current infestation develops.

Producers continued to report significant and severe outbreaks of the wheat stem sawfly. Some locations under heavy pressure reported less than satisfactory results from solid stem wheat varieties, while other locations were very satisfied. Variable performance of solid stem varieties is likely related to the effects of weather on the degree of solidness that is attained in the wheat stem. On a positive note, David Weaver reported higher populations of sawfly parasitoids, possibly a result of the cool wet weather. Also, the use of cultural management tactics such as trap cropping have grown in popularity and some producers are adopting their own versions of this strategy.

MSU's pheromone monitoring program caught fewer adult pale western and army cutworm moths during the fall of 2009. Consistent with the lower trap catches, reports of cutworm damage during the spring of 2010 were sporadic. Dingy cutworm appears to be an emerging pest of pulse crops in the MonDak region. This fall, MSU Extension entomology with help from county agents and producers, began research to evaluate the effectiveness of different pheromone blends for trapping dingy cutworm.

While the cool spring slowed many insects, it favored wireworm feeding. In the absence of hot dry soil conditions that drive wireworms deeper, wireworms were able to spend more time near the soil surface feeding on developing seedlings. This extended feeding period enabled them to outlast the residual period of insecticidal seed treatments. Wireworms could be observed boring inside of the crowns of larger spring wheat plants. In general wireworm infestations appear to be increasing and MSU Extension entomology has begun research to address this growing problem.

An economic infestation of Haanchen mealybug (HMB) was detected in an irrigated barley and spring wheat field in Southwest Montana (Madison County) this summer. Typically HMB is a sporadic pest but it became a significant problem in barley in 2003 (Idaho) and 2006 (Montana – North Central region). It will likely continue to be a sporadic pest but barley and spring wheat producers are encouraged to recognize the signs and symptoms of this pest. Similarly, infestations of the orange wheat blossom midge (OWBM) continue to be restricted to the Flathead valley and surveys did not detect this insect in the triangle.



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**DO YOU HAVE A COMMENT OR QUESTION
REGARDING THE MONTANA IPM BULLETIN?**

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**If you wish to have the Montana IPM Bulletin emailed to you for free,
contact the MSU Pesticide Education Program office: ctharp@montana.edu.**



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