Montana IPM Bulletin

MONTANA STATE UNIVERSITY | EXTENSION

June 2010

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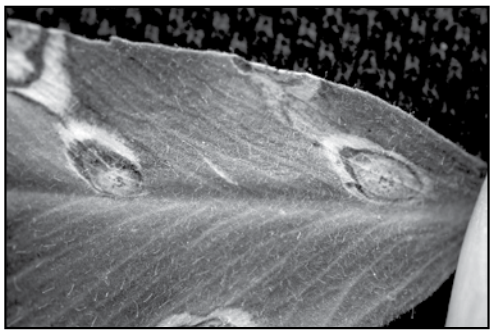
INSIDE:

MONTANA Department of AGRICULTURE

Digital resources for integrated pest management

by Mary Burrows (MSU Plant Pathologist)

Digital resources have revolutionized the way we obtain information, identify and manage pests. At MSU, the IPM group has been involved in a number of efforts to develop and maintain online resources so you can have access to expert, research-based information 24/7. This is especially important for people (including myself) who expect instant answers. One of the problems with online information is obtaining information that is useful, relevant, and appropriate for your particular situation. For example, I am involved in a number of projects to enhance our fact sheets on the High Plains IPM Guide. One of the ways we will be enhancing our fact sheets is to offer video content. Many of our clients learn better visually, by watching a two to three minute video, rather than reading a dry fact sheet that may contain terms they do not understand and therefore ignore. I was searching YouTube for a relevant video explaining how to diagnose and treat fire blight. One of the first videos I found described the symptoms well and was about 3 minutes long, but the recommendations were vague and incomplete. The presenter recommended spraying copper on a fire blight affected tree. As a pathologist, I knew this recommendation was going to be of limited use in a home landscape in Montana, and he didn't mention other control options. The primary way to control fire blight is sanitation and pruning of affected tissue (cleaning the pruners with alcohol between each cut to avoid spreading the pathogen) 8-12 inches below the area of infection which is indicated by vascular browning. To prevent bloom infection, there are chemicals (the antibiotic streptomycin) which can be sprayed at the time of bloom. Streptomycin will not treat an existing infection. Copper can be used at bud break to prevent splash dispersal of the disease-causing bacteria to the trunk and branches. This is going to be relevant in humid climates and where there are a number of trees in a close area such as an orchard, not the single tree most homeowners have in their lawn. That video, which was professionally done and seemed authoritative, was unfortunately misleading. In this digital age, you need to be very careful where you obtain your information. The following are some current digital resources you might be interested in using and some of the projects we are currently working on:



ASOCHYTA BLIGHT, PHOTO COURTESY OF SAM MARKELL, 2010

AgAlerts

If you are a producer, landscape professional, or are curious about what is happening in Montana agriculture, we will keep you updated via the AgAlert system. AgAlerts are notices about plant diseases, insects, invasive plants, pesticide safety, etc., that Extension specialists think you should be aware of. They generally consist of a notice accompanied by identification and management recommendations. To sign up for AgAlerts by e-mail go to PDIS.org. If you would like them faxed, contact Mary Burrows (mburrows@montana.edu; Phone: 994-7766; Fax 994-7600).

Digital diagnosis

If you are submitting a sample to your county agent or the Schutter Diagnostic Lab for diagnosis, we encourage you to bring or send pictures of the situation. Sometimes we do not need a physical sample because we can help you based on a picture alone. A

(Digital Resources continued from pg 1)

good photo of the problem always helps us diagnose the cause of injury. Your county agent can upload these directly into PDIS (Plant Diagnostic Information System) with the sample submission.

High Plains IPM Guide
(wiki.bugwood.org/HPIPM)

The main advantage of using the HPIPM guide for pest identification and recommendations is that pesticide recommendations and cultural methods of pest control are updated regularly. The disadvantage is, you need to know what you're looking for. To help you identify unknown disorders and pests, we have added keys for weed identification and wheat pests (http://wiki.bugwood.org/HPIPM: Small_Grains), and are currently adding one for woody ornamentals. Future updates will include tools for pest management including degree day models, explained later in this article, and videos explaining specific pests and their management as well as general IPM topics.

Degree Day (DD) tools

Montana IPM has been working with the Integrated Plant Protection Center at Oregon State University to make degree day tools available for your use. You can pick any pest for which there is a model (http://uspest.org/wea/, 65 models are currently available). Click on Montana, pick your nearest weather station, and start using the models to determine when to scout and treat your pest of interest. We're currently working to get the fire blight model in a user-friendly format. The risk level for the major urban centers will be sent out as an AgAlert by the diagnostic lab weekly during the high-risk season. The MSU Potato Lab is working with OSU on potato pest DD models and how to train growers to use them.

Plant Management Network

The Montana IPM Program has purchased a license for all Montana-based IP addresses to access the Plant Management Network (www.plantmanagementnetwork.org) for free. This is essentially a set of professional journals and fact sheets. This is a great source of information. You can sign up for a monthly e-mail digest which is very helpful to keep up-to-date on current issues.

Bugwood/IPM Images

If you're trying to find images of a specific pest, start with Bugwood (http://wiki.bugwood.org/). Bugwood is the Center for Invasive Species and Ecosystem Health. They are a centralized source of information on pests and invasive species. They work closely with Extension professionals, the National Plant Diagnostic Network, and various government agencies to develop and maintain online resources on pests. A couple of useful tools include a list of commercially available biological controls, the Early Detection and Distribution Mapping System for invasive species, lists of pests on vegetable crops, etc.

MontGuides

MontGuides are in-depth fact sheets available from MSU Extension. They cover a wide variety of topics including IPM issues, and are available for free online at www.msuextension.org/store.

eXtension
(www.eXtension.org)

eXtension (pronounced E-extension) is an effort by the federal Cooperative Extension Service to centralize many of the resources available online. It is arranged into 'communities of practice.' All of the fact sheets are branded with MSU since we are members of eXtension, but not all of the information is of Montana origin, which can be misleading. This is not a great resource for pest management, but it has potential.

Pest management tool kit:

Superior, MT. June 5th. Mineral County PAT & Recertification (six private applicator recertification credits). This six hour PAT training course is designed to train and certify new private applicators as well as aid veteran applicators in brushing up on their pesticide safety knowledge. For more information contact the Mineral County Extension Office (406) 822-3545 or see complete online agenda at www.pesticides.montana.edu and select 'private applicator program.'

Stevensville, MT. June 5th. Noxious Weeds & Poisonous Plants (one private applicator recertification credits). 120 minute course on noxious weeds and poisonous plants. For more information contact the Ravalli County Extension Office (406) 375-6611 or see complete online agenda at www.pesticides.montana.edu and select 'private applicator program'.

Bozeman, MT. MSU Post Research Farm. July 8th. Crops and Weeds Field Day, 8:30 A.M. to 3:30 P.M., Attendees can receive Certified Crop Adviser CEU credits and commercial and private applicator pesticide recertification credits. For more information, visit www.ipm.montana.edu/CropWeeds.

MSU Extension Plant Pathology website: (www.msuextension.org/plantpath) Find Extension publications, the Wheat Pest Calendar, 'Quick ID' guides for wheat diseases, a list of fungicides for disease control in cereals, and links to diagnostic resources.

MSU Extension Publications: (www.msuextension.org/store) Find three new Extension bulletins that describe the biology, ecology and management of hoary alyssum (EB0194), Eurasian watermilfoil (EB0193), and blueweed (EB0195). Hardcopies are available (free, plus shipping and handling) or a PDF can be downloaded from MSU Extension.

Wheat pest LUCID key: http://wiki.bugwood.org/HPIPM:Small_Grains.Use this tool to identify pests, including weeds, that occur in your crop.

The recently restructured Montana statewide noxious weed list: http://agr.mt.gov/

The USDA ARS lab in Sidney has a webpage dedicated to grasshoppers (www.sidney.ars.usda.gov/grasshopper/) listing everything (and more!) that you ever wanted to know about grasshoppers. This includes forecast maps, fact sheets and a user-friendly electronic key for identifying adult grasshopper species.

Restructured Noxious Weed List

by Jane Mangold (MSU Invasive Plant Specialist)

The Montana Department of Agriculture restructured the noxious weed list in early 2010. The restructured list includes five priorities of invasive plants, as opposed to four categories in the previous list, the addition of three new plant species, and the removal of one species.

The new noxious weed categories are Priority 1A, 1B, 2A, 2B, and 3. A weeds is prioritized based on how abundant and widespread the species is across the state. Priority 1A weeds are not present in Montana while Priority 1B weeds have limited presence in Montana. Management for 1A and 1B weeds includes prevention, education, and early detection and rapid response to eradicate or contain; Priority 2A weeds are common in isolated areas of Montana. Priority 2B weeds are abundant in Montana and widespread in many counties. Management objectives for 2A and 2B weeds are suppression, but may range from eradication to containment depending on their prevalence in a given area. Priority 3 weeds are not noxious weeds, but regulated plants that have the potential to have significant negative economic and ecological impacts. Control of Priority 3 weeds is not mandated, but intentional spread or sale of them is prohibited.

The weeds added to the noxious weed list include curlyleaf pondweed (*Potamogeton crispus*; Priority 1B), hydrilla (*Hydrilla verticillata*; Priority 3), and cheatgrass (*Bromus tectorum*; Priority 3). Curlyleaf pondweed is a submersed aquatic plant. It is native to Eurasia, Africa, and Australia and was introduced to U.S. waters in the mid-1880s by hobbyists who used it as an aquarium plant. Curlyleaf pondweed can form dense mats that may interfere with boating and other open water recreation activities. It is highly competitive and can displace native aquatic plants.

CURLY PONDWEED PHOTO COURTESY OF INVASIVE.ORG

Like curlyleaf pondweed, hydrilla is a submersed aquatic plant that that can form dense mats and outcompete native aquatic plants. It is native to Asia and was widely spread across the world as part of the aquarium trade. It is currently not known to be present in Montana. Both curlyleaf pondweed and hydrilla can be spread from one body of water to another via plant fragments on boats, trailers, and other recreational equipment.

Cheatgrass is an annual grass that has been present in Montana for decades, but has been increasing more rapidly over the past several years. It is native to the Mediterranean region and was introduced to North America in the late 1800s. Since then, it has become widely established across the western U.S. and is problematic in crop-, range-, and wild lands. It can reduce plant community diversity, decrease forage and crop yield and quality, and alter fire regimes.

Common crupina (*Crupina vulgaris*) has been removed from the list. Although it has been on the noxious weed list for years in Montana and is a noxious weed in some nearby states, it has never been found in Montana. Observations and research suggest it is not likely to become established in Montana due to the absence of suitable habitat.

CHEATGRASS PHOTO COURTESY OF INVASIVE.ORG

Pest Forecast

Pathology |

Plant diseases are weather-dependent, but we routinely see damping off and Rhizoctonia root rot (bare patch) in wheat during cool, wet springs. At tillering we see early-season leaf diseases including tan spot and septoria. We may also start seeing wheat viruses at tillering or shortly thereafter. At heading we will see white heads which may be due to drought, wheat stem maggot, crown rots, etc. Sign up for AgAlerts to keep up-to-date on plant diseases in Montana.

Invasive Plants |

Yellow starthistle, a highly invasive annual forb, has been found in Montana twice in the last year. One infestation was found in Beaverhead county in September 2009, and another infestation was found in Stillwater county in March 2010. Montana is working diligently to prevent this weed from becomeing established across the state. Be on the lookout this summer, especially if you live in a county near Beaverhead or Stillwater counties.

Cropland Weeds |

In cereal fields, cheatgrass management should be done as early as possible. Research has shown that fall applied herbicides work better than spring applications. Also, within a season, the more you wait the less control you achieve. Thus, don't wait to control those cheatgrass seedlings.

Pesticide Education |

All uses of carbofuran on food crops such as alfalfa, cotton, small grains (wheat, oats, and barley), soybeans, sugarcane, sweet corn, and tobacco are no longer allowed. The broadcast foliar product 'Furadan 4F' has been widely used for the control of grasshoppers and other insect pests in small grains and/or alfalfa across Montana. This product's long residual activity has made it an excellent tool for use against recurring

(Pest Forcast continued from pg 3)

insects such as grasshoppers. Producers/ consultants need to use or recommend other alternative pesticide chemistries in summer 2010. For more information regarding the carbofuran cancellation process or the MDA pesticide disposal program refer to the complete MSU Pesticide News release at the MSU Pesticide Education website (pesticide.montana.edu) then select 'news' then 'miscellaneous' then 'carbofuran use on food crops not allowed'.

Entomology |

Based on the numbers of adult moths caught in pheromone traps last summer and fall, risk of cutworm damage to crops in Montana may be lower compared to 2009. The loss of lindane as a seed treatment, and no-till agricultural practices that favor soil insects, may account for increasing damage to small grains by wireworms. The presence of wireworms in thin patchy stands can be confirmed using bait stations. This summer grasshoppers will be the major insect story. The area of Montana infested with 15 or more grasshoppers per square yard has increased from 1 million acres in 2006 to 17 million acres in 2009. In 2010 grasshoppers are expected to cause significant damage to Montana's rangeland and cropland.

EPA Announces New Restrictions on Phosphine Fumigants

by Cecil Tharp (MSU Pesticide Education Specialist)

Rebecca Toone, 4, and her 15-month-old sister, Rachel, died after inhaling phosphine gas from a commercial pesticide application of aluminum phosphide near their home to manage rodent populations

PHOTO'S COURTESY OF THE TOONE FAMILY

EPA announced new restrictions on aluminum and magnesium phosphide fumigants as a result of recent pesticide poisonings. In February 2010, Rebecca and Rachel Toone, tragically died after apparently inhaling phosphine gas, which was from a commercial pesticide application of aluminum phosphide. It seems the commercial applicator neglected to read and follow the pesticide product label requirements which clearly describe a minimal distance of 15 feet from a residence.

This is not the first time fumigants have been connected to deaths across the United States. Aluminum phosphide fumigants also killed a South Dakota girl in 2000 and was linked to sickening a family and killing their 2-year-old girl in Lubbock, Texas in 2007 (pesticides.montana.edu/News/). All of these incidents have spurred EPA to implement new restrictions regarding the phosphine fumigants. These restrictions include:

- prohibiting all uses around residential areas.
- increasing buffer zones for treatment near non-residential buildings that may be occupied by people or animals.
- from 15 feet to 100 feet
- posting warning signs (placards) in fumigated areas that include a 24-hour emergency number, DANGER / PELIGRO, and that remain in place for 48 hours.
- using only on burrowing pests in agricultural areas, orchards, non-crop areas (such as pasture and rangeland), golf courses, athletic fields, parks and recreational areas, cemeteries, airports, rights-of-way, earthen dams, and other non-residential institutional or industrial sites.
- writing fumigant management plans before all applications of phosphine products, including all burrowing pest fumigations.

Steve Owens, assistant administrator of EPA's Office of Prevention, was quoted as saying "These new safeguards prohibit the use of these toxic pesticides near homes and impose restrictions to protect our families from exposure to them." Nathan and Brenda Toone (parents of Rebecca and Rachel), said they "applaud any efforts by government officials to continually seek to improve the safety of our community."

Some examples of pesticide products that are effected by this action include:

-Fumi-Strip
-Detaphos
-Fumi-cel
-Fumitoxin
-Magtoxin Granules
-Gastoxin
-Fumex
-Phosfume
-Phostoxin
-Weevil-cide

Montana private and commercial / government applicators in the category of 'Industrial, Institutional, Structural and Health-Related Pest Control' may apply fumigants for managing pest infestations. These applicators should be aware of these EPA rule changes and remain vigilant with reading and following all product label requirements. Montana certified applicators should realize they are the key to preventing this type of pesticide poisoning from occurring close to home.

Information regarding this EPA news release and aluminum and magnesium phosphide can be found at 'epa.gov/oppsrrd1/reregistration/alphosphide/'. If you have questions regarding this article contact the MSU Pesticide Education program — Cecil Tharp, Pesticide Education Specialist, 406-994-5067, ctharp@montana.edu.

MSU Crops and Weeds Field Day

by Fabian Menalled (MSU Crop Weed Specialist)

On Thursday July 8th from 8:30 A.M. to 3:30 P.M., there will be a crops and weeds field day at Montana State University's Post Research Farm, west of Bozeman.

This is an opportunity for pest control advisors, farm managers, chemical company cooperators, Extension agents, and students to learn about on-going crop and weed research programs at MSU. Attendees can receive Certified Crop Adviser CEU credits, and commercial and private applicator pesticide recertification credits.

Research and demonstrations plots of weed management techniques, pesticide application strategies, plant pathology, and crop traits will be open throughout the day with staff available to answer questions. Weed, pathogen, insect, and cropping systems specialists will discuss the results of their field trials.

Speakers will include Fabian Menalled, Ed Davis, Jane Mangold, Lisa Rew and Zack Miller on weed management, Luther Talbert on spring wheat breeding, Mary Burrows on plant disease management, Cecil Tharp on sprayer calibration, Rick Engel on soil applied urea management, and David Weaver on wheat stem sawfly.

Registration is $10 and covers refreshments, lunch and handbook. Please pre-register no later than July 2nd by contacting Fabian Menalled at (406) 994-4783 or via e-mail to menalled@montana.edu. Registration is available at the Post Farm on July 8th as well. The Post Farm is located eight miles west of Bozeman on Highway 191.

AGENDA:

8:30-9:00
Registration and welcome

9:00-9:30
Cheatgrass management in rangelands

9:30-10:00
Minimizing movement of weed seeds

10:00-10:15
BREAK

10:15-11:00
Sprayer calibration

11:00-11:45
Spring wheat breeding program

11:45-12:15
Ammonia losses from soil applied urea

12:15-1:00
LUNCH

1:00-1:30
Wheat stem sawfly management

1:30-2:00
Management of fungus leaf diseases

2:00-2:30
Joint management of viruses and weeds

2:30-3:00
Cropland weed management—small grains and pulse crops

3:00-3:30
Questions and answers

PHOTO TAKEN BY FABIAN MENALLED, 2009

Papers to Ponder:

C. Klittich. 2008. Milestones in fungicide discovery: Chemistry that changed agriculture. Plant Health Progress. Available online: www.plantmanagementnetwork.org/pub/php/review/2008/milestones/. This is a nice review of the evolution of fungicides for disease control. From gods, vapors, demons and decay to plant pathogens and fungicide resistance.

Benzel, K.R., T.K. Mosley, and J.C. Mosley. 2010. Defoliation timing effects on spotted knapweed seed production and viability. Rangeland Ecology and Management 62:550-556. Available online: www.bioone.org/doi/pdf/10.2111/08-191.1. Spotted knapweed was clipped at various growth stages throughout the summer to determine what timing of clipping resulted in greatest reduction of viable seeds. While clipping at any time reduced the percentage of viable seeds relative to unclipped plants, clipping during late-bud to early-flower or full-flower stage reduced the number of viable seeds by nearly 100 percent. Mowing or grazing at these growth stages can provide effective control of spotted knapweed seed production.

Smith, R.G., D.A. Mortensen, and M.R. Ryan. 2010. A new hypothesis for the functional role of diversity in mediating resource pools and weed-crop competition in agroecosystems. Weed Research 50: 37–48. This paper provides one of the most provocative hypotheses on how crops and weeds compete for soil resources. The authors propose in agricultural systems management practices, such as crop rotation, source of fertility and weed management, result in inputs to the soil and that these inputs directly or indirectly become soil resource pools from which crops and weeds may partition resources. Farmers can manipulate these resource pools to minimize the impact of weeds on crops. Validation of this hypothesis

(continued on pg 8)

Grasshoppers in Rangeland and Cropland

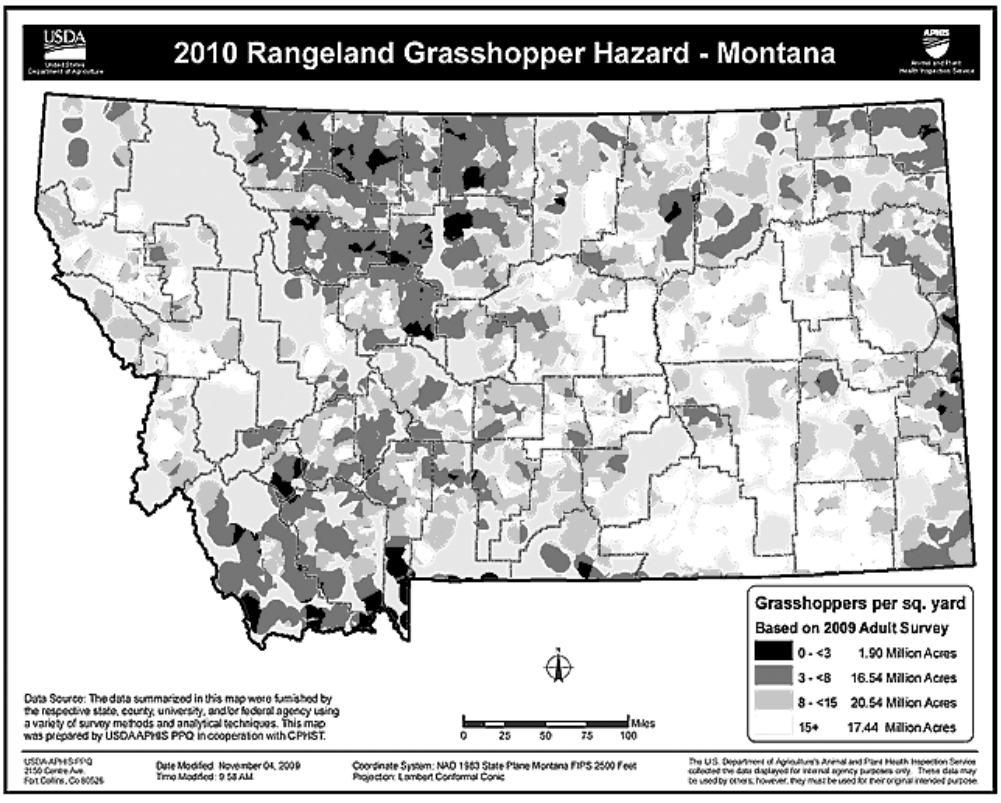
by Kevin Wanner (MSU Cropland Insect Specialist)

The area of Montana infested with 15 or more grasshoppers per square yard has increased from 1 million acres in 2006 to 17 million acres in 2009. Grasshopper populations tend to increase during periods of drought and region-wide outbreaks typically last from two to four years. More than 100 species occur in Montana, but of these only about twenty can reach the high densities that cause economic damage. Outbreaks typically will be dominated by only a few species and the particular species can vary with geography and habitat. The migratory, two-stripped and clear-winged grasshoppers are common species in the current outbreak.

In rangeland 15 to 20 grasshoppers per square yard is considered an economic threshold for treatment. At these densities grasshoppers can result in 200 to 500 pounds of lost forage per acre of rangeland, depending on conditions such as precipitation. Scouting typically begins at the end of May or the first week of June. Reduced Agent and Area Treatment strategies (RAATs) can be used to control grasshoppers in rangeland. USDA research has demonstrated that RAATs, a "skip pass" approach that also uses lower rates of insecticide, normally results in 80 to 95 percent control (compared to 85 to 99 percent control with complete blanket coverage at the full insecticide rate). A RAATs approach may use 50 to 75 percent less insecticide, cost one-half to two-thirds less and also provide refuge strips for beneficial insects. Dimilin, an insect growth regulator, is commonly used in large-scale grasshopper spray operations. Dimilin inhibits chitin synthesis. Chitin is an important part of an insect's exoskeleton, and without it, they die when they attempt to molt and form a new exoskeleton (which occurs between each juvenile instar stage). Because adult grasshoppers no longer molt, dimilin does not affect adult insects, a fact that also makes this insecticide less toxic to honeybees. Timing applications is critical, the majority of grasshoppers should be in the third instar stage (typically during the second to third week of June in Montana, depending on the weather).

Grasshoppers are notorious for their ability to move into cropland from surrounding grassy areas. Cropland that is surrounded by large areas of grass is particularly at risk. Crop protection is typically achieved by applying a border treatment of insecticide to keep the grasshoppers from entering the crop. A border width of 150 feet surrounding the crop may be adequate for control, but if grasshopper densities are high, control may require up to a quarter mile border treatment. Under extreme pressure, control may be difficult and multiple border treatments may be required. Border areas and crop margins should be monitored after treatment to ensure that grasshoppers do not re-enter the field. A total of 8 to 14 grasshoppers per square yard within the field, or 20 to 40 per square yard along the field margin, are considered to be economic thresholds for spring wheat.

Winter wheat can be particularly susceptible since it emerges when large adult grasshoppers may be present. Damage thresholds for emerging winter wheat are lower, three to seven per square yard within the field, or 11 to 20 per square yard around the margin. Boarder sprays can be applied but timing is critical. Boarder sprays need to be applied just before the wheat emerges; if it is applied too early there may not be enough residual, it is applied too late, the damage may have already occurred. Alternatively, one or two passes of insecticide treated seed along the crop margin can protect winter wheat from grasshopper damage, and eliminates the timing concern. Adult grasshoppers are more difficult to control, and the higher range of the label rate is recommended. Additional information can be found on the USDA ARS Sidney grasshopper website, www.sidney.ars.usda.gov/grasshopper/. The High Plains IPM Guide website, www.highplainsipm.org/, provides detailed information on sampling, thresholds and management.



USDA APHIS PPQ, 2009

Ask the Expert

Q: I planted peas for the first time this year, and there was two percent ascochyta in the seed lot. What should I do?

A: Mary Burrows says…The Montana State Seed Lab will test seed for the fungi causing Ascochyta blight in chickpea, pea, and lentil. I recommend that growers do not plant, or treat seed with Mertect or Dynasty to reduce potential inoculum if Ascochyta is present in seed above the threshold of zero percent for chickpea, seven-tenth percent for pea, and two percent for lentil. To have disease, you need a susceptible host, a pathogen, and a favorable environment. Manipulate any corner of that triangle and you can manage disease. Since your seed was above the recommended threshold, pay attention to that field, particularly if there is significant moisture. If you do see disease symptoms which consist of target-shaped, concentric circles of brown tissue, you may consider a foliar fungicide. Your choice of fungicide will be based on the amount of disease you see in the field, the yield potential of the crop, cost of application, and predicted weather patterns. Note that the Ascochyta species infecting chickpea is resistant to strobilurin fungicides (such as Headline, Quadris, etcetera) so these products are no longer recommended for use on chickpea. The species of Ascochyta infecting peas and lentils are different, and fungicide resistance has not yet been identified, so strobilurins can still be used for Ascochyta control. If you are not certain you have ascochyta blight, take a sample consisting of whole plants with symptoms to your county agent for identification, call me, or submit a sample directly to the Schutter diagnostic lab. Good pictures are always helpful when submitting a sample – sometimes I can diagnose a disease based on a picture alone, sent via e-mail. But they need to be good pictures clearly showing the symptoms and the affected area in the field.

Q: I recently re-seeded a pasture infested with cheatgrass with native grasses and forbs. Should I fertilize it?

A: Jane Mangold says…No, unless you are certain there are no cheatgrass seeds or other weed seeds in the seed bank, which is unlikely. Most weedy species, including cheatgrass, will capitalize on additional nutrients to a greater extent than native species. Therefore, additional nutrients may only increase the growth of weedy species emerging from the seedbank and shift the competitive balance in their favor.

Q: I heard that some of my neighbors are having trouble managing herbicide resistant weeds. What exactly is herbicide resistance and what can I do to avoid it?

A: Fabian Menalled says…Weeds, like any other living organism, are variable. Some of them have an innate ability to survive and reproduce after a treatment with a dose of herbicide that would normally be lethal. Every time you apply a herbicide you are killing the susceptible plants and selecting potential herbicide resistant individuals. If during several years you use the same herbicide over and over again, you are increasing the selection pressure and speeding development of these herbicide resistant weeds. To reduce the risk of selecting herbicide resistant biotypes, you should rotate among herbicides with different site of action, applied either as tank mixes, premix formulations or sequential applications. Also, you should rotate management practices, such as the incorporation of timely cultivation. Finally, crop rotation is an excellent tool to reduce the selective pressure on herbicide resistant weeds. The Montguide "Preventing and managing herbicide resistant weeds in Montana" gives more information on herbicide resistance, and it can be downloaded from MSU Extension (www.msuextension.org/store).

Q: How do I know when it is safe to re-enter an area previously sprayed with pesticides?

A: Cecil Tharp says…Pesticide product labels describe safe re-entry-intervals (REI) in the 'Agricultural Use Requirements' or 'Non Agricultural Use Requirements' box, generally on the first or second page of the pesticide product label. This box will generally describe additional personal protective equipment that must be worn if an individual enters a sprayed area prior to the REI. If it is after the REI an individual can re-enter the sprayed area without additional protective equipment.

Q: Why are we seeing such large grasshoppers so early in the season?

A: Kevin Wanner says…Most grasshopper species overwinter as eggs. A few species in Montana overwinter as partially developed juveniles (late instar nymphs) and are large in appearance early in the spring. These include the speckled range, green-striped and velvet-striped grasshoppers. However, these species are not of economic concern because they occur in low numbers and their distribution is patchy. More information is available online at: www.sidney.ars.usda.gov/grasshopper/ID_Tools/F_Sheets/.

(Papers tp Ponder continued from pg 5)

would have important implications for the development of management strategies that aim to reduce yield loss impact per unit weed plant density and the fundamental principles of integrated weed management, such as the concepts of weed thresholds and critical periods.

Alavanja M.C.R., Sandler D.P., Lynch C.F., Knott C., Lubin J.H., Tarone R., Thomas K., Dosemeci M., Barker J., Hoppin J.A., Blair A. Cancer Incidence in the Agricultural Health Study. 2005. Scand J. Work Environmental Health. 31 (S1): 39-45. This study evaluated the overall cancer occurrence among farmers and their spouses from pesticide exposures over a lifetime. Private and commercial applicators were associated with a higher risk of developing prostate cancer.

Kamel F., Tanner C., Umbach D., Hoppin J., Alavanja M., Blair A., Comyns K., Goldman S., Korell M., Langston J., Ross G., Sandler D. Pesticide Exposure and Self Reported Parkinson's Disease (PD) in the Agricultural Health Study. 2007. Am J. Epidemiol. Feb 15, 165(4): 364-374. This study evaluated the overall relation of self reported Parkinson's Disease to pesticide exposure. This study suggests that exposure to certain pesticides may increase PD risk.

Vernon et al. 2009. Wireworm Management I: Stand Protection Versus Wireworm Mortality with Wheat Seed Treatments. Journal of Economic Entomology, 102(6): 2126-2136. The efficacy of several insecticides applied to wheat seed was evaluated for wireworm control. The authors confirmed the idea that lindane, used as a seed treatment for several decades before its removal from the market, not only protected wheat stands but also caused wireworm mortality. The neonicotinioids (that are currently used) provided excellent stand protection but did not reduce wireworm populations. The authors conclude that future studies using seed treatments need to consider both stand protection and wireworm mortality.

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

Send your questions or suggestions to:

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