Montana IPM Bulletin

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FIGURE 1. Medusahead seed heads showing long awns that point upward and outward. Photo by Jane Mangold

INSIDE:

MONTANA Department of AGRICULTURE

It's no myth: The invasive annual grass, medusahead, is in Montana

Jane Mangold, MSU Invasive Plant Specialist, Department of Land Resources and Environmental Sciences

Medusahead *(Taeniatherum caput-medusae)*, an exotic and invasive annual grass, was documented in Montana for the first time in November 2013. Medusahead is named after Medusa, the monstrous snake maiden of Greek mythology. The finding of medusahead on rangeland in Montana is almost as scary as the Greek myth. Read on to find out why.

Medusahead has long awns that emerge from the seed head and point outward and upward (Figure 1). The awns take on a twisted appearance as the plant dries in mid- to late summer. The native grasses bottlebrush squirreltail *(Elymus elymoides)* and foxtail barley *(Hordeum jubatum)* look similar to medusahead, but the mature inflorescence of these species fall apart easily when handled, while medusahead inflorescences stay intact. Other clues to identifying medusahead include wiry stems with a few short, narrow leaves and bright yellow-green color. When medusahead grows with other invasive annual grasses like cheatgrass *(Bromus tectorum),* which it often does, the yellow-green sheen will be highly visible after cheatgrass has turned brown. Medusahead height can range from six to 24 inches.

High silica content is another characteristic of medusahead that assists in identification and helps explain why it is not a desirable rangeland grass. Silica is a chemical found in sand and quartz and is used to make glass. The high silica content gives the grass a rough and sharp texture and leads to slow decomposition rates. Areas dominated by medusahead may have a layer of plant litter several inches thick, which can impede germination and growth of other species and pose fire danger (Figure 2). Medusahead is not very palatable to livestock and wildlife due to high silica content and stiff glumes and awns, thus forage value of invaded rangeland is very low.

FIGURE 2. Medusahead litter. Photo by Jane Mangold

As a winter annual, medusahead grows from seed each year. It typically germinates and emerges in fall, overwinters as a seedling, and begins growing again the following spring. It flowers and produces seed by early to mid-summer, and the entire life cycle begins again. This life history is similar to other invasive annual grasses in Montana, namely cheatgrass and Japanese brome (*Bromus japonicus*). Like annual brome grasses, medusahead germinates and grows quickly, usurping water and nutrients from native perennial grasses that emerge from dormancy later in spring and generally have slower growth rates. On some rangeland in regions of the West, medusahead has outcompeted native grasses to form dense monocultures (Figure 3).

Native to Eurasia (Spain, Portugal, France, Morocco, Greece, Turkey), it was first collected in the U.S. in southwestern Oregon in 1884. It thrives in regions with warm, dry summers and cool, moist weather from fall through spring. It's most common in inland valleys of California, the Intermountain West including the Great Basin, and the Columbia Basin. It

(Medusahead, continued from page 1)

tends to thrive in clayey soils. The infestation recently reported in Montana is on the Flathead Indian Reservation in southeastern Sanders County, west of Highway 93 between Arlee and Ravalli. Missoula County Weed Coordinator Bryce Christiaens found it in mid-November and submitted a sample to the Schutter Diagnostic Lab at Montana State University for confirmation. Response efforts are underway and include specialists from the Confederated Salish Kootenai Tribe, local county weed districts, and Montana State University Extension. Preliminary efforts will involve outreach/education, surveying the area to estimate the total area infested, and drafting a long-term management strategy.

Medusahead is listed as a noxious weed in California, Colorado, Nevada, Oregon, and Utah. Since it has only recently been confirmed in Montana, it is important to identify this grass so that infestations can be detected when they are small and manageable. Disturbances like overgrazing increase susceptibility to invasion on rangeland. Researchers in Oregon found that an increase of one perennial bunchgrass per square yard resulted in a 15-20 percent decline in medusahead establishment. Spring burning to remove litter followed by a fall application of a pre-emergent herbicide containing the active ingredient imazapic has been shown to be the most effective method for managing established populations. If little-to-no desirable vegetation remains, revegetation should be integrated with burning and herbicides.

FIGURE 3. Monoculture of medusahead in southeastern Oregon. Photo by Kirk Davies, USDA-ARS.

Be on the lookout for medusahead this spring and summer. If you think you've found medusahead, please contact your local county Extension agent, weed district coordinator, or Jane Mangold at jane.mangold@montana.edu or 406-994-5513.

Weed management in a changing climate

Fabian Menalled, MSU Crop Weeds Specialist, Department of Land Resources and Environmental Sciences

Rural communities across Montana face numerous issues that challenge environmental and economic sustainability. Among them is agro-ecosystems' vulnerability to water shortages, extreme weather events, and increased fire frequency and pest outbreaks. Climate variability and its impact on crops, livestock, insects, weeds, and pathogens is at the core of these issues. The complexity of Montana's agricultural system makes predicting direct and indirect impacts of climate change on natural resources a daunting task. Increased awareness of consequences that predict warmer temperatures, drier summer conditions, and increased atmospheric carbon dioxide concentrations will help design resilient agro-ecosystems.

There is consensus among climate scientists that human activities are changing the climate globally. For example, a recent review of more than 4,000 scientific publications indicated that 97 percent of studies support the position that humans are causing a change in global climate. Over the last two centuries, and particularly in the last 50 years, there has been an unprecedented increase in atmospheric concentration of carbon dioxide and other greenhouse gases. This change in atmospheric composition has increased Earth's ability to retain heat, leading to global-scale warming of the oceans and atmosphere, as well as precipitation pattern changes. For example, global carbon dioxide concentration recently exceeded 400 parts per million (ppm) which is about 120 ppm more than pre-industrial levels and higher than any measured in the last 800,000 years (for more evidence visit http://climate.nasa.gov/evidence and http://www.ncdc.noaa.gov/paleo/icecore/).

Data from weather stations in the western half of Montana suggest the annual average temperature has increased by 2.4°F over the last 100 years (Pederson et al. 2010. Climate Change 98:113-54). Also, extremely cold days (≤ 0°F) terminate on average 20 days earlier and decline in number, while extremely hot days (≥90°F) show a three-fold increase. Increased temperatures are expected to be associated with earlier spring snowmelt and reduced late-summer river and stream flows. Projections for future precipitation are less certain because it is often a small-scale process that varies across large geographic areas, but data from 1901-2006 suggest the Rocky Mountain region is getting drier (Figure 4).

Agriculture in Montana is a dynamic enterprise that through history has successfully responded to variations in environmental conditions, trade, policies and technologies. However, the challenges created by climate change are new and require novel perspectives to manage weeds and invasive plant species. Concentrations of atmospheric carbon dioxide, precipitation patterns, and air temperatures are critical factors affecting the growth of both crops and weeds. For example, while plants vary in response to changes in environmental conditions, recent research indicates that even small changes in atmospheric carbon dioxide concentration of 50 ppm can increase the growth rate and combustibility of cheatgrass, an exotic invasive annual grass. Similarly, Canada thistle responds strongly to atmospheric carbon dioxide, with up to a 180 percent increase in biomass production from pre-industrial to modern carbon dioxide conditions. Other weed species that have shown positive responses to increases in carbon dioxide concentration include common lambsquarters, green foxtail, and redroot pigweed.

In the short term, it is possible that Montana's crops could benefit from increased carbon dioxide concentrations. Unfortunately increased levels will also enhance growth and

(Weed management, continues on page 4)

Horn Fly control for rangeland and pastured beef cattle

Greg Johnson, MSU Veterinary Entomologist, Department of Animal and Range Sciences

The horn fly, *Haematobia irritans (L.)*, is one of the most important summer pests attacking rangeland and pastured cattle in Montana. Horn flies feed frequently and exclusively on blood, piercing the skin of cattle with their proboscis and taking 20-25 small blood meals each day. Annoyance and irritation due to the constant presence of flies and their bites causes defensive behaviors by cattle that prevents adequate food consumption and rest. The energy that cattle expend fighting flies results in decreased milk production, reduced weight gain and poor feed efficiency. Annual losses in cattle production and control costs due to this ubiquitous pest are estimated between $700 million to $1 billion in the U.S.

Horn flies are produced in manure pats that are scattered over a wide, diverse landscape. Integrated pest management tactics such as biological control or sanitation (manure removal) that are effective in confined animal facilities (feedlots and dairies) do not provide the control necessary for horn flies on pastured cattle. For example, natural populations of predators (beetles), parasites (tiny wasps) and competitors (dung beetles) occur in these landscapes and play a role in regulating immature horn fly populations early in summer. But these natural enemies are unable to maintain horn fly numbers below an economic threshold (generally 200-300 flies per animal) as temperatures increase and fly populations explode. Release of commercially-reared parasitic wasps, which is often done in confined animal facilities, has been shown to result in low parasitism rates and poor parasite survival in range and pasture systems.

Because horn flies spend the majority of their lives associated with cattle, applying insecticides to the animal is the primary control method. There are several ways to accomplish control, and a number of different insecticides are available.

Self-application methods

Dust bags contain insecticide dust that filters through the bottom of the bag with cattle contact. Best horn fly control is achieved when cattle are forced to pass under the bag on a daily basis to get water. Generally, older cattle and bulls will dominate a dust bag when placed at locations where cattle loaf during the day (i.e., free-choice). Dust bags in forced-use situations provide 75-90 percent horn fly control. Horn fly control is 25-50 percent less using free-choice dust bags. Bags should be inspected regularly and recharged with insecticide dust or replaced if damaged.

Back rubbers and oilers

A back rubber consists of a chain wrapped in burlap and secured with wire. The burlap is treated with a back rubber insecticide which is diluted with No. 2 diesel fuel or commercial back rubber oil. Back rubbers and oilers, like dust bags, work best in a forced-use situation.

Insecticide ear tags

Insecticide ear tags contain one or more insecticides embedded in a plastic matrix. Movement of the tag slowly releases small quantities of insecticide which travels through the hair coat of the animal. When ear tags were first introduced in the late 1970s, they were very effective against horn flies and provided season-long control. However, within a few years, horn flies developed resistance to pyrethroid insecticides used in the tags and many producers stopped using them. Research has demonstrated that resistance can be avoided by using different insecticide ear tags on a yearly basis. My lab conducted a six-year tag rotation study where we used a tag containing zeta-cypermethrin (a pyrethroid) in year one; a tag containing organophosphate insecticides – diazinon and chlorpyrifos in year two; and a tag containing abamectin – an ivermectin-like compound in year three. The sequence was repeated in years four, five and six. We recorded excellent, season-long horn fly control for each of six years, indicating flies were still susceptible to the different insecticides. By rotating ear tag insecticides, we can preserve one of the more popular methods for horn fly control.

Animal sprays and pour-ons

Pyrethroid insecticide sprays come ready-to-use, or must be diluted with water before applying. It is important to get complete coverage of each animal with spray. Pour-ons containing either pyrethroids or macrocyclic lactones (ivermectin-like compounds) are applied in measured doses based upon body weight. Treatments provide two to three weeks control and must be reapplied for season-long horn fly control.

Oral larvicides (feed additives)

Oral larvicides are incorporated into mineral blocks, tubs or loose mineral. These larvicides contain either altosid or dimilin which are insect growth regulators or rabon, an organophosphate insecticide. After consumption, the insecticide is passed in manure and kills developing fly larvae. Adult horn fly numbers may appear unaffected if cattle consuming feed additives are in close proximity of an untreated herd. Supplementary control measures (dust bags or pour-ons) may be necessary if adult flies migrate from nearby untreated herds.

A list of insecticides registered for horn fly control on cattle and details on use can be found in the MontGuide "Horn Flies on Cattle: Biology and Management" at http://msuextension.org/publications/AgandNaturalResources/MT200912AG.pdf.

(Weed management, continued from page 2)

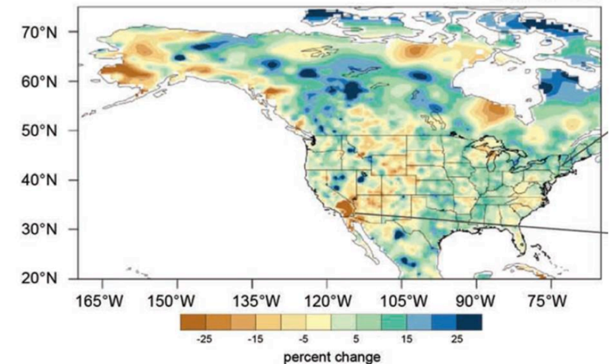

FIGURE 4. Observed 20th century (1901-2006) precipitation trends for North America. Data source: Univeresity of Delaware, Matsuura and Willmott 2009; map can be found in Climate Change and Agriculture in the United States: Effects and Adaptation, USDA-ARS Technical Bulletin 1935.

competitive ability of many weed species, and their genetic variability relative to crops suggests that elevated carbon dioxide could increase the competitive advantage of weeds. In accordance, the few studies that have jointly evaluated impacts of both increased carbon dioxide and temperature on crops and weeds indicated that the otherwise potentially beneficial effects on crops will be negated by increased weed interference.

Changes in climatic conditions and carbon dioxide concentration could impact weed management through changes in herbicide efficacy. As a general rule, growth at elevated carbon dioxide levels and temperature translate into morphological and physiological changes which could alter herbicide uptake, translocation, and effectiveness. Research indicates that high carbon dioxide concentrations result in increased leaf thickness and reduced stomata (small apertures, in the epidermis of leaves or stems through which gases are exchanged) numbers, factors which ultimately limit the uptake of foliar applied herbicides. Several greenhouse and field studies evaluated weed responses to glyphosate (Roundup and other generic products) under ambient and elevated carbon dioxide conditions. Although elevated levels had no effects on glyphosate sensitivity in redroot pigweed, the recommended rates of herbicide reduced but did not eliminate the growth of common lambsquarters. Similarly, field trials with Canada thistle indicated that the efficacy of glyphosate and glufosinate (a cell membrane disruptor) were reduced at elevated carbon dioxide.

To better manage crops and weeds in a changing world, adaptive responses should be based on knowledge about how plant communities respond to predicted unprecedented climate scenarios. Certainly, the answer to this question is not simple and exceeds the scope of this article. Recognizing the challenge, though, is the first step to develop technical solutions that will be required by end-users.

To further explore how climate change might affect agricultural production in the U.S., please consult the U.S. Department of Agriculture technical report Climate Change and Agriculture in the United States: Effects and Adaptation, Technical Bulletin 1935 (available at http://www.usda.gov/oce/climate_change/effects_2012/effects_agriculture.htm).

For specific information on Montana's vulnerability to climate change, visit the Montana Department of Environmental Quality (http://deq.mt.gov/ClimateChange/default.mcpx). Readers can also consult the recently published book *Weed Biology and Climate Change* (2011) by L. H. Ziska and J. S. Dukes. The recently released Fifth Assessment Report of the Intergovernmental Panel on Climate Change provides detailed information on many of the topics discussed in this article (https://www.ipcc.ch/report/ar5/).

EPA Taking Comments: Proposed Changes to Worker Protection Standards

Cecil Tharp, MSU Pesticide Education Specialist, Department of Animal and Range Sciences

EPA is proposing and taking comments on new safety measures to protect farm workers under the Worker Protection Standards. This mainly affects workers or handlers on pesticide-treated areas of Montana timber tract operations, forests, farms, orchards, greenhouses, and nurseries.

A brief overview of proposed changes to the Agricultural Worker Protection Standard (WPS) includes:

- frequency of mandatory trainings (from once every five years to annually) to inform farm workers about protections they are afforded under the law, including restrictions on entering pesticide-treated fields and surrounding areas, decontamination supplies, access to information and use of personal protective equipment. Expanded trainings will include instructions to reduce take-home exposure on work clothing and other safety topics.
- Expanded mandatory posting of no-entry signs for the most hazardous pesticides; signs prohibit entry into pesticide-treated fields until residues decline to a safe level.
- Minimum age requirement: Children under 16 will be prohibited from handling pesticides, with exemption for family farms.
- No-entry, 25-100 foot buffer areas surrounding pesticide-treated fields will protect workers and others from exposure from pesticide overspray and fumes.
- Measures to improve states' ability to enforce compliance, including requiring employers to keep records of application-specific information and farm-worker training and early-entry notification for two years.
- Personal Protection Equipment (respirator use) consistent with Occupational Safety & Health Administration standards to ensure respirators provide protection, including fit test, medical evaluation, and training.

(Worker Protection, continues on page 5)

On-Farm Research

Mary Burrows, MSU Plant Pathologist, Department of Plant Sciences and Plant Pathology

I am routinely challenged by growers who observe responses to prophylactic use of fungicides on dryland winter wheat on their own farm, while my data indicates little consistent benefit. I welcome questions because it indicates that growers are trying to advance their knowledge and try new things. What worries me about those conversations is that when we discuss trials, most are conducted without replication of the treatments. I give a series of talks in the state about why we include controls and replicate treatments in research. Controls are included to know if treatment had an effect compared to standard practice. The control doesn't have to be 'do nothing' but it does have to be representative of the field, and not just the field edge or skips in application. If a control is on the field edge, it is not representative, and generally not replicated. For example, if you spray a fungicide (or insecticide, herbicide, or micronutrient, etc.) and leave the field edge as a control, that edge may yield less than the rest of the field regardless of treatment, and bias the conclusion. The other thing I emphasize is replication. Replications are generally made over space (for example, alternating strips), but can also be made over time. The reason we replicate treatments is because there is inherent error in experiments, and to estimate true mean, or the true result, you need more than one estimate. For example, there is wide variation in yield across a field. If you randomly select 10 acres of land, you likely get different yield estimates, even where no treatment had been applied. If you applied a treatment to one area of a field, it is impossible to know, given one observation, whether that treatment had an effect or if it was due to chance.

Several states have very successful on-farm research networks. A group of faculty at MSU is initiating participatory experiments in hopes that the community will engage in this process and see benefits of experimental design, systematic application and data analysis, and communicating reliable results within the farming community. Our hope is that interest in this project will grow and directly benefit Montana growers. For more information, see:

FIGURE 5. On-farm research in Franklin County Neb., where cooperator drilled 60-ft. strips of a soil builder cover crop mix alternating with 60-ft. strips without cover crops. Corn will be planted in spring and corn yields recorded this fall. Photo taken by Chuck Burr, UNL Extension Educator.

- New UNL Extension Interactive On-Farm Research Guide, features video, audio, and "how-to" information to start conducting trials with your equipment and conditions.
- Purdue Collaborative On-Farm Research http://www.agry.purdue.edu/ext/ofr/ features link to protocols, data record sheet templates, results from previous On-Farm Trials and additional resources.
- On-Farm Research Guide by Jane Sooby of the Organic Farming Research Foundation http://ofrf.org/sites/ofrf.org/files/docs/pdf/on-farm_research_guide_rvsd.pdf provides an overview of experimental designs and considerations, with additional resources.
- On-Farm Research Guidebook http://web.aces.uiuc.edu/vista/pdf_pubs/GUIDEBK.PDF by Dan Anderson from University of Illinois, Department of Agricultural Economics, a step-by-step guide for experimental designs and a sample problem to demonstrate data analysis methods.

(Worker Protection, continued from page 4)

- Make available to farm workers or their advocates (including medical personnel) information specific to application, including pesticide label and Safety Data Sheets.
- Additional changes make rules more practical and easier to comply for farmers.
- Continues the exemptions for family farms.

This represents more than a decade of stakeholder input by federal and state agencies, farm workers, farmers, and industry.

See details at http://www.epa.gov/oppfead1/safety/workers/proposed/index.html.

Tips for preparing your comments

Montanans are invited to share views with EPA on the proposed changes. Comments will assist EPA in implementing the final WPS rule. First, read about the major areas of change, under http://www.epa.gov/oppfead1/safety/workers/proposed/index.html, 'Questions for Your Consideration on Major Areas of Change.' Review major subheadings to comment on, including training and notifications for workers and handlers, hazard communication, information exchange between handler employers and agricultural employers, handler restrictions, restrictions for worker entry into treated areas, display of basic pesticide safety information, decontamination and emergency assistance, personal protective equipment, monitoring handler exposure to cholinesterase inhibiting pesticides, exemptions and exceptions, and general revisions to the WPS and implementation. Then open the 'Notice of Proposed Rulemaking' link for full explanations, rationale, and discussion of alternatives. Finally, submit suggestions with docket number (EPA-HQ-OPP-2011-0184) and subheadings (ex. Handler Restrictions).

For detailed directions on submitting comments or to review all details, go to http://www.epa.gov/oppfead1/safety/workers/proposed/index.html.

Comments must be submitted on or before June 17, 2014.

For further information, see online proposed WPS revisions at http://www.epa.gov/oppfead1/safety/workers/proposed/proposed-wps-factsheet.pdf, or WPS revisions website, http://www.epa.gov/oppfead1/safety/workers/proposed/index.html.

For further questions, contact Kathy Davis, Field and External Affairs Division, Office of Pesticide Programs, Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460-0001; telephone (703) 308-7002; fax (703) 308-2962; email address: davis.kathy@epa.gov.

Ask the expert

Q. If Canada thistle is in the bud stage and cut with hay, will there be viable seed in the forage? Also, if the plant is in the flowering stage, is that far enough along for the plant to make seed if it is cut?

A. Jane Mangold says:

If Canada thistle is in bud stage when it is cut, there should be no viable seed production. If flowers have not yet opened, there can be no pollination and thus no viable seed production. To address the second question, a study from South Dakota found that flowers that were cut six to seven days after flowering had very low viability (<1%). After seven days, viability increased, especially between eight and 10 days. Viability ranged from one to 90 percent between eight and 19 days after blooming, depending on the year. A good rule of thumb would be that if plants have been flowering for less than one week, there should be little to no viable seed production. After a week, I think it is more of a gamble, but highly likely that at least some viable seeds would be in the forage. One challenge to this rule of thumb is assessing how uniform flowering is across a field. There may be some portions of the field that start flowering earlier than other patches. A difference of a day or two around the one week mark can make a big difference according to the literature.

Q. Where can I get a plant problem diagnosed?

A. Mary Burrows says:

The MSU Schutter Diagnostic Lab is available to identify plant problems. Diagnosticians and specialists identify diseases, insects and abiotic problems on plants. They also identify plants (weeds) and herbicide issues. There are some requirements to receive a good diagnosis.

- Send in whole plants with roots whenever possible. Wrap soil around roots in a bag so none gets on foliage (Figure 6).
- Keep samples fresh by placing in plastic bags.
- Collect samples with mild to severe symptoms as well as a healthy comparison.
- Place samples in a sturdy container and ship early in the week.

Include background information; plant problems often are influenced by many different factors, so include as much information as possible.

- Description of problem
- Plant and variety identification
- Cultural practices (irrigation, fertilizer, pesticides)

There are a variety of videos to help with your sample submissions. Try the NPDN Channel, http://www.youtube.com/user/npdnchannel, NCSU http://www.youtube.com/watch?v=STUSMtAOhGU, or The Extension Fairy, http://www.youtube.com/watch?v=STUSMtAOhGU.

FORMS: http://diagnostics.montana.edu/

MAIL TO: Schutter Diagnostic Lab
119 Plant BioScience Facility
Bozeman, MT 59717-3150

CALL: 406-994-5150 – general diagnostics
406-994-5704 – insect identification
406-994-1871 – plant identification

Q. Should I mow kochia before flowering to reduce seed production?

A. Fabian Menalled says:

While mowing kochia will not totally eliminate seed production, it will significantly decrease its seed production ability. More important, mowing will prevent kochia plants from breaking off at the soil surface in the fall and tumbling for miles while disseminating seeds. As a general rule, kochia seeds die two or three years after being produced. Thus, minimizing seed production and preventing kochia plants from breaking off and rolling across fields will help reduce infestations. At MSU, we tested our own lawn mowers (Figure 7): we grazed a heavily infested kochia field with sheep and our preliminary results suggest that it significantly reduced seed production.

FIGURE 6. Well-packaged plant on left, poorly packaged plant on right (soil will mix with plant material degrading sample)

FIGURE 7. Sheep grazing kochia in a fallow field at the MSU Post Farm, Bozeman, with ungrazed kochia in the left foreground. Photo by Fabian Menalled

Q. Is my Montana private or commercial pesticide license valid within tribal boundaries?

A. Cecil Tharp says:

No! A state pesticide license isn't valid within tribal lands of Montana. States don't have jurisdiction within tribal boundaries, thereby rendering a state pesticide license invalid unless a tribal agreement is in place. Montana pesticide applicators must apply for a federal pesticide certification. The federal pesticide certification can be obtained for free by sending a copy of both sides of your state pesticide permit, as well as the federal application form to EPA Region 8:

US EPA, Region 8
Attn: Region 8 Certification
1595 Wynkoop St, 8P-P3T
Denver, CO 80202

For more details and the federal application form, see the pesticide news release at http://www.pesticides.montana.edu/News/Miscellaneous/ by selecting 'ag alert tribal certification.'

Pest Management Toolkit

From Cecil Tharp:

There is a free pesticide recordkeeping app available for use with iPhone, iPad, Android phones and tablets. PeRK (Pesticide Recordkeeping App) allows private applicators to follow the 1990 Farm Bill pesticide recordkeeping requirements easily and effectively. This app records pesticide applied, quantity applied, product application rate, target site and pest(s), date and time of application, temperature, wind speed, and disposal method. The records are saved and stored within the app on the device and can be exported via email as a .csv file, which can be opened in Microsoft Excel and other common software programs.

View this app or download at http://cropwatch.unl.edu/ by searching PeRK.

Initial Private Applicator Training

Missoula. April 26. Six private recertification credits. For information or to pre-register contact Steffany Rogge-Kindseth, (406) 258-4211.

Great Falls. May 2. Six private recertification credits. For information or to pre-register contact Rose Malisani, (406) 454-6980.

From Mary Burrows:

Check out the revised **Montana IPM Center website http://ipm.montana.edu/** which lists workshops and training opportunities, pest management tools, IPM programs at MSU and other valuable resources. Be sure to view the Cropweed Management Link (http://ipm.montana.edu/cropweeds/) and Urban IPM Program (http://www.urbanipm.org/courses.cfm) under Workshops and Training Opportunities.

Check out the revised **Schutter Diagnostic Laboratory website http://diagnostics.montana.edu/** for a description of services the lab provides and links to the most recent forms to submit samples. In the blue square "Reports," check out the "2013 Diagnostic Lab Report" highlighting recent accomplishments and impacts.

Producers are increasingly planting cover crops to improve soil quality, help manage weeds or pests and provide livestock forage. **Replacing summer fallow with a cover crop** can decrease saline seeps, nitrate leaching and erosion, while increasing soil organic matter and microbial activity. A seven minute video created by Clain Jones and other agriculture experts with Montana State University provides a great summary: **http://youtu.be/JWMT-uXyWZM**. More information on cover crops and this study is on Jones' web site, http://landresources.montana.edu/soilfertility/ under "cover crops."

From Fabian Menalled:

eOrganic, a comprehensive source of information for organic producers. eOrganic is the organic agriculture community of practice within eXtension, an Internet-based collaborative environment where Land Grant University content providers exchange objective, research-based knowledge to solve real challenges in real time. This USDA-NIFA distant-learning program reaches thousands of organic farmers, researchers, Extension specialists, and the general public across the nation and world through educational articles, webinars, and videos. Resources provided by eOrganic include information about organic agriculture, organic certification, cover cropping, pest management, and more. You can become a member of eOrganic or search for information at http://eorganic.info .

July 8, 2014, Annual Crop and Weed Field Day. Arthur Post Agronomy Farm, Bozeman. Participants can visit research and demonstration plots of weed management, pathogen control strategies, cropping systems, and crop traits. MSU faculty, staff, and students will be available to answer questions. Attendees are eligible to receive Certified Crop Adviser (CCA) Continuing Education Unit credits as well as commercial and private applicator pesticide recertification credits. The Post Farm is seven miles west of Bozeman. Please save the date and contact Fabian Menalled (menalled@montana.edu) with any questions.

From Jane Mangold:

New Montana State University Extension publication, *Herbicides and Noxious Weeds: Answers to Frequently Asked Questions*, answers over 30 commonly asked questions about noxious weeds and herbicide use. Available at the Montana State University Extension store (store.msuextension.org), EB0214.

New Montana State University Extension publications, MontGuides, *Plant Identification Basics* (MT201304AG) and *Grass Identification Basics (*MT201402AG), cover anatomy and terminology common in plant identification field guides and dichotomous keys. Available at the Montana State University Extension store (store.msuextension.org).

The state noxious weed list was revised in December 2013. See the new list at http://agr.mt.gov/agr/Programs/Weeds/PDF/2013WeedList.pdf

"Montana Noxious Weed Education Project" has resources for incorporating noxious weeds into K-8 curriculum. Visit http://agr.mt.gov/agr/Programs/AgClassroom/k-8projects/noxiousweededucation/

Meet your specialist

Laurie Kerzicnik, Insect Diagnostician and IPM Specialist, Schutter Diagnostic Lab

Where/when did you receive your degrees?

I received my bachelor's in Zoology from Miami University in Oxford, Ohio in 1995. I got my Master's degree and doctorate from Colorado State University (Fort Collins) in 2002 and 2011.

What is your field of interest (scholastic and research)?

My field of interest is in biological control of pests and arachnology.

When did you arrive in Bozeman?

I arrived in Bozeman on October 22, 2013 with an air mattress and a vocal cat.

Where are you from originally?

I was born in Cincinnati, Ohio and spent middle school and high school outside of Detroit, Michigan.

Where have you worked/taught in the past?

I worked at Colorado State University as a Research Associate studying integrated pest management of the greenbug and Russian wheat aphid in diverse and conventional cropping systems in eastern Colorado. I also worked at Crop Production Services in product information.

What do you like to do in your spare time? Any hobbies?

I like to ski, hike, camp, and jump rope.

What are some important areas of focus in your field?

I focus on proper identification of insects and spiders. I also try to recommend integrated approaches to controlling insect pests rather than relying solely on chemicals.

Describe some past research projects:

Some of my past research included describing spider diversity in eastern Colorado, spiders as pest control agents in agricultural systems, and looking at spider gut contents.

What are some of your current projects?

Since I started in October, I am learning many new insects and spiders. I am also working on updating fact sheets for some current pests.

How can farmers use your research to their benefit?

My past research will help them to understand spiders as beneficial predators in agricultural systems.

What projects would you like to focus on in the future?

I would like to focus on educational outreach for current invasive pests and pests on the horizon.

DO YOU HAVE A COMMENT OR QUESTION REGARDING THE MONTANA IPM BULLETIN?
Send your questions or suggestions to:

Cecil Tharp
Pesticide Education Specialist
P.O. Box 172900
Montana State University
Bozeman, MT 59717-00
Phone: (406) 994-5067
Fax: (406) 994-5589
Email: ctharp@montana.edu
Web: www.pesticides.montana.

Jane Mangold
Invasive Plant Specialist
P.O. Box 173120
Montana State University
Bozeman, MT 59717-3120
Phone: (406) 994-5513
Fax: (406) 994-3933
Email: jane.mangold@montana.edu

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