



## AGSC 242 - Crop ID By Mac Burgess

One thing that has come from the curriculum assessment process for both the Crop Science and Sustainable Food and Bioenergy Systems Sustainable Crop Production programs is the need for a course in crop identification. AGSC 242 - "Crop ID" was already in the catalog, advertised as meeting for the first five weeks of fall semester. I offered this class this fall for the first time in recent memory, and it went very well. We met every Wednesday evening from 5-8 pm, culminating with our final exam on September 27. In preparation for the course, I made several plantings of annual field crops in the field in June and in the PGC in August and September. I also worked with Perry Miller and Jeff Holmes who had a nice collection of unusual field crops at the Post Farm. Between the challenges of deer, birds, frost, and declining day length, it is harder than you might think to have representative examples of field crops in late September. Thanks to the PGC for a great backup plan option!

A substantial portion of the student's grade for the course came from their production of a Crop ID manual suited to their own needs. I supplied reference materials on emergence type, leaf shape, leaf venation, leaf margin, ligules & auricles, floral morphology, crop growth timing and geography etc. Students were encouraged to produce a book they would keep to use for future crop ID

purposes, and were allowed to use their book for the final exam.

For the fourth week of class we were rained out of the field, so we practiced crop categorization using magnetic flash cards on the door of the barn at the Horticulture Farm and made flour with a hand grinder from whole grains of soft and hard red and white wheats, purple hullless barley, buckwheat, rye, and corn. I don't know of any better way of demonstrating the difference between soft and hard wheats than to make flour in a hand grinder. We then made waffles from the different flours, and someone brought bacon and apple juice too. Predictably, soft white winter wheat from Washington won the whole grain waffle contest, but even the rye and buckwheat waffles were surprisingly palatable.

On the final exam students were responsible for identifying up to 30 species of crop plants at any growth stage from seedling to mature plant (though I often gave them examples of several growth stages) by common name, Latin binomial, and plant family. The crops of the final exam were: maize, soybean, wheat, barley, rye, oat, triticale, sorghum, rice, common bean, pea, lentil, chickpea, safflower, sunflower, canola, camelina, flax, sugar beet, potato, faba bean, buckwheat, industrial hemp, hops, squash (example of imperfect flowers), pistachio (the only other economically-important dioecious crop), alfalfa, sainfoin, and winter vs spring





AGSC 242 students taking their final exam on Sept. 27.



AGSC 242 students learning to identify species and market classes of grain by taste, texture, and hand-crank milling performance.

wheat based on a hypothetical 70 mph highway scenario in June. We also looked at

dill, and I noted the presence of a 100+ acre field of dill on the Fairfield bench this year, presumably for production of oil for food flavoring. I decided that those who want to learn the forage and turf grasses should take agrostology. And, no, I wasn't able to bring hemp to the final exam, but we did visit a field here in the Gallatin Valley participating in the Montana Industrial Hemp Pilot Program. Since hemp is dioecious, photoperiod sensitive, and a bit mysterious, this visit was a great learning experience.

Thirteen students completed the course this fall, and I learned several things that will allow me to do an even better job with this offering in future years, hopefully with



greater enrollment. For future years, I am considering expanding into more forage crops. I was surprised by the interest in vegetable crop ID among our crop science students.

### **Mites and Galls and Weeds, Oh My! By Sarah Eilers**

The Schutter Diagnostic Lab had a prolific season. Samples were submitted from all across the state from Richland County to Beaverhead County. Over 1,500 samples were processed by mid-September. Submissions by organic and small acreage farms increased while agricultural samples decreased, most likely due to the historical drought that hit Montana.

Bacterial Blight was significant this spring, likely due to the cool wet spring in most locations. Lilacs, apples, and even peonies were all affected by the bacteria. Eriophyid mites were also noteworthy. They were identified on garden crops, landscape plants and even evergreen trees. Finally, one of the biggest jumps, in increased numbers, were the submissions that were suspected of herbicide exposure. These samples ranged from agricultural submissions to home gardens.

One of the highlights of the season was the creation of a new IPM webpage <http://ipm.montana.edu/> which offers easier access to Montana State University resources. A new resource page was also created, within the Urban webpage, with links to relevant sites. Digital offerings will be available through this page.

The Turf to Trees – Urban IPM Workshop was in August with 30 enrollees from all across the state. Dr. Eva Grimme coordinated and hosted this event and Dr. Megan Kennelly, from Kansas State University, was the guest speaker. She spoke about abiotic and biotic issues of ornamentals and turf. Toby Day guided the participants on a walking tour of the campus pointing out the diseased, damaged, and infested trees. A talk by Noelle Orloff had everyone on their feet using keys to identify



*Noelle Orloff explaining the use of plant identification keys during her hands on workshop.*



*During a tour of campus, Toby Day demonstrated diagnostics in the field.*

common trees and shrubs. Dr. Laurie Kerzicnik spoke about the challenging insect issues facing the urban landscape.

### **Herbicide Carryover in Garden Amendments**

**By Noelle Orloff, Schutter Diagnostic Lab**  
Perhaps the more ambitious gardeners among us are busy preparing their gardens for next year's growing season. If you are amending your soil with compost or manure, keep in mind that not all amendments are good for the garden, particularly if plant material, soil, or manure used to make the amendments is contaminated with persistent herbicides. The Schutter Diagnostic Lab received many





*Potato sample showing distortion symptoms consistent with plant growth regulator herbicide injury.*

herbicide injury samples this season, and garden vegetable samples showing symptoms consistent with plant growth regulator herbicide injury were a common submission. In many of these cases, we suspected carryover of persistent herbicides in garden amendments such as compost, manure, or topsoil.

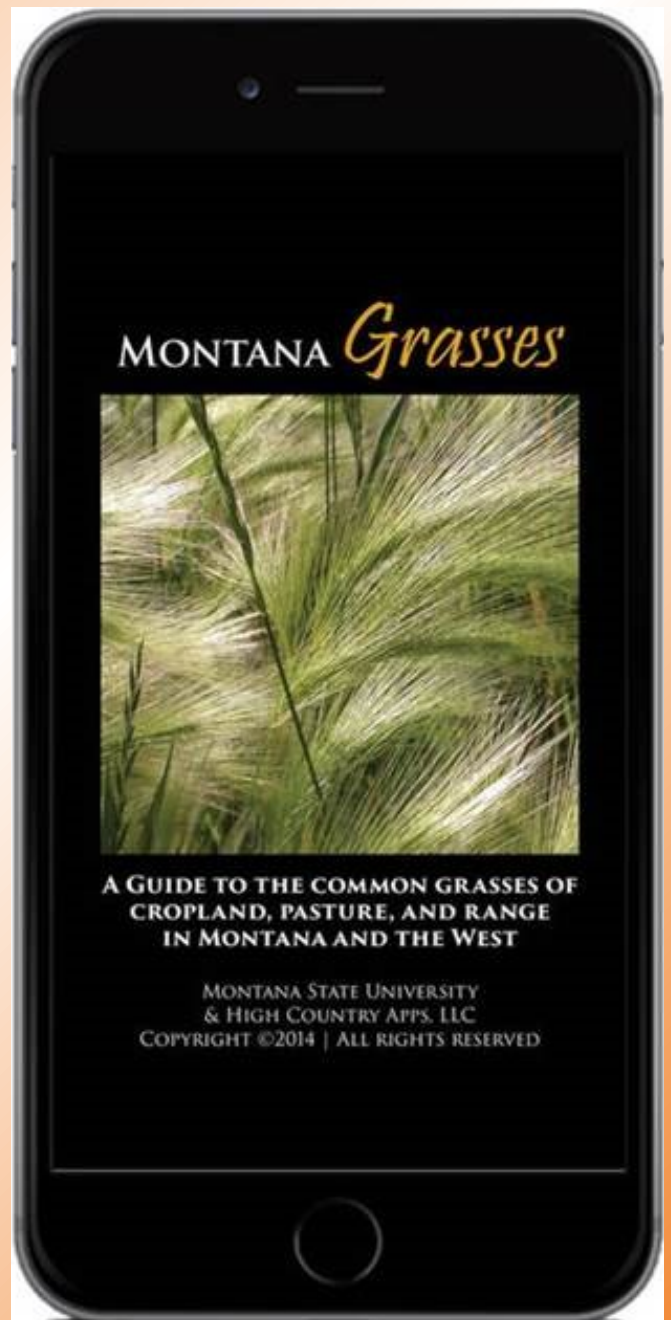
Symptoms include extreme cupping and twisting of leaves, twisting and/or cracking of stems, and general distortion of plant parts. Leaves may feel thicker than normal, and may have veins that look more parallel than usual. These symptoms can come from other sources, including herbicide drift if there are many hosts affected, or insect or disease issues if symptoms are not widespread. One clue that herbicide carryover may be the cause include many different hosts being affected, but usually most pronounced injury is to tomatoes and potatoes, with peppers, beans, peas, squash, and other vegetables also showing some symptoms. Another clue is a recent application of manure or compost, or a recent load of topsoil being brought in to fill raised beds.

Please see the link below for more information about this issue, and for instructions on how to perform a simple bioassay to determine if an amendment may be contaminated.

<http://msuextension.org/publications/AGandNaturalResources/MT201612AG.pdf>

## Updated Montana Grasses App By Matt Lavin

A updated version of the Montana Grasses app is now available from High Country Apps (<http://highcountryapps.com/MontanaGrasses.aspx>) for \$4.99. If you have already purchased this app, the update should have been automatically installed. This updated version now includes 210 species, mostly grasses, but also some of the common sedges, rushes, and cattails. The app is designed to help field workers identify species of grasses and grass-like plants. It is also designed to help people better understand the grasses of Montana and provide a resource



for learning what grass cultivars are available for restoration and reclamation work. Once downloaded, no wireless connection is needed to use the app. This app will be updated again in the future and represents an ongoing collaboration between High Country apps and MSU faculty and staff.

### **Montana Ag Live Schedule**

10/1 - Richard Browning, Montana Department of Revenue, will field questions concerning the 2017 Agricultural Land re-appraisal and look at possible natural disaster property tax relief.

10/8 - Joshua Wagoner, Region 4 Fish Wildlife and Parks Maintenance Supervisor, will bring viewers up to date on Managing weed issues along Montana rivers and parks.

10/15 - Perry Miller, Cropping systems agronomist, and Joe Janzen, Agricultural economist, will look at the production and marketing issues surrounding Montana's booming pea and lentil production. Learn why Montana's agricultural landscape has changed so dramatically.

10/22 - Lance McNew, wildlife management researcher in MSU's Animal and Range Science Department, will discuss "Critter" problems and living with wildlife in Montana.

### **Awards**

Hikmet Budak was awarded the status of Honorary professor from the University of Worcester in the United Kingdom.

### **Grants**

Mary Burrows, USDA, Regional Pulse Crop Diagnostic Laboratory. 9/1/17.

Mary Burrows, USDA, Montana State University's Extension Implementation Plan for Integrated Pest Management. 9/1/17.

Michelle Flenniken, Israel Binational Science Foundation, Inter-species virus

transmission in pollinator communities: Spatio-temporal patterns and functional effects. 10/1/17.

### **Publications**

Ammirati, J., Niskanen, T., Bojantchev, D., Peintner, U., Kuhnert-Finkernagel, R., Cripps, C. (2017). Spring and early summer species of *Cortinarius*, subgenus *Telamonia*, section *Colymbadini* and *Flavobasilis*, in the mountains of western North America. *Mycologia* 109:3, 443-458.

H.B. Cagirici, B. Alptekin, H. Budak. RNA Sequencing and Co-expressed Long Non-coding RNA in Modern and Wild Wheats. (2017). *Scientific Reports*. DOI:10.1038/s41598-017-11170-8.

D. Kim, B. Alptekin, H. Budak. CRISPR/Cas9 genome editing in wheat (2017). *Functional and Integrative Genomics*. DOI: 10.1007/s10142-017-0572-x.

H.B. Cagirici, S. Biyiklioglu, and H. Budak. Assembly and annotation of transcriptome provided evidence of miRNA mobility between wheat and wheat stem sawfly (2017). *Front. Plant Sci.* | doi: 10.3389/fpls.2017.01653

Xie, J., Shu, P., Strobel, G., Chen, J., Wei, J., Xiang, Z., and Zhou, Z. (2017) *Pantoea agglomerans* SWg2 colonizes mulberry tissues, promotes disease protection and seedling growth. *Biological Control* 113: 9-17.

Strobel, G. (2017) Natural products from endophytic microbes- historical perspectives, prospects, and guidance in Chemical Biology of Natural Products. G Gragg, P Grothaus & D. Newman ed. Taylor Francis Publ. Co. 189-203.

### **Jack O'Lanterns**

#### **By Toby Day, Horticulture Extension Specialist**

Every holiday, I try to figure out why we have certain traditions and historically, where those traditions come from. I am amused that the many reasons we have such traditions aren't



exactly what you were told in school, in church, or by your parents. Anybody that has heard me convey the reason why we decorate Christmas trees will no longer look at ornaments the same. So, when it comes to Halloween, what is the real reason we decorate pumpkins? What makes us rip the guts from the gourd, cut scary faces into it and light it on fire?

In my limited research, I unearthed the Irish myth of "Stingy Jack." According to [www.history.com](http://www.history.com), Stingy Jack tricked the Devil several times. (You can read the full story here: <http://www.history.com/topics/halloween/jack-olantern-history>). Apparently, when Jack died, and due to his many shenanigans, God didn't want him in heaven. Conversely the Devil was still a little upset and wouldn't (actually, couldn't) let him into hell. So, the Devil sent him off into the night, roaming the earth with only a burning chunk of coal to light his way. Stingy Jack carved out a turnip, placed the coal in the turnip and voila! The Jack O'Lantern was created. The Irish and the Scottish carved faces in potatoes and turnips and placed them in windows and on porches to scare away Stingy Jack and other bad spirits. The British carved large beets the same way. Immigrants from these countries came to the new world and found that squashes and pumpkins, which were native to America, were much easier to carve and held a candle better. Voila! The modern version of the Jack O'Lantern was born.

Pumpkins are mostly grown for making Jack O'Lanterns, but they are also grown for processing. However, in an agriculture survey in 2014, of the over 90,000 acres of pumpkins grown commercially, only 15 percent were grown for processed pumpkins. The rest of the pumpkins (1.275 billion pounds) are grown to eventually be hacked up with a knife, lit on fire, and if you are in my neighborhood, rolled down the street by inebriated teenagers at the end of the night.

## October Birthdays

Autumn Weis	1
Hannah Estabrooks	6
Derek Lewis	9
Florence Dunkel	10
Bob Sharrock	11
Joseph Fenoglio	11
Monica Brelsford	13
Jamie Sherman	20
Fernando Guillen-Portal	22



## Recipe of the Month

### Super Tasty Pumpkin Seeds

- 2 c raw whole pumpkin seeds
- 2 T butter, melted
- 1 T Worcestershire
- 2 t salt
- 1 t garlic powder



Clean pumpkin seeds of any pumpkin pulp and rinse. Fill a bowl with lightly salted water and soak the pumpkin seeds for 2 hours.

Preheat oven to 300 degrees F (150 degrees C). Line a baking sheet with nonstick aluminum foil.

Drain seeds and pat dry with paper towels. Mix melted butter, Worcestershire sauce, salt, and garlic powder in a bowl, and toss the seeds in the seasoned butter mixture until coated. Spread seeds out onto the prepared baking sheet in a single layer. Bake in the preheated oven until seeds are crunchy and golden brown, about 1 hour; stir and turn seeds every 15 minutes.