Plant Science Says

Happy Easter!

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Lab Focus
The Cereal Quality Laboratory
By Deanna Nash

The main function of the Cereal Quality Laboratory (CQL) is to conduct the end-use quality analyzes on all the experimental lines for the Montana State University (MSU) wheat breeding programs. The CQL has three full time employees with over 40 years of combined baking experience between research technicians Jackie Kennedy and Harvey TeSlaa. We currently have eleven student employees in the lab to help with our high volume quality testing.

Jackie Kennedy

Harvey TeSlaa

All new varietal releases and recommendations for variety release meet stringent end-use quality requirements. Meeting these stringent end-use parameters is of vital importance for Montana to maintain its reputation as a reliable supplier of high quality, high protein wheat.

The quality of Montana wheat is central to ensuring that Montana wheat farmers receive the best possible prices for their wheat and that the export markets remain satisfied. Montana producers have enjoyed a well-deserved reputation for excellence in Montana grown wheat which is why numerous customers prefer wheat grown in Montana. Montana's arid environment contributes to high protein content and thus Montana wheat has great bread making qualities.

These qualities are emphasized by the wheat breeding programs at MSU. In addition to focusing on good milling and baking quality traits the breeding programs at MSU also look at the quality of our wheat for Asian noodle products.

Every fall the primary focus for early generation selections is protein quality. A measure of protein strength is taken on several thousand breeder's lines each year. Lines having sufficient protein content, strength and good agronomic traits are advanced to more rigorous testing.
The more advanced testing includes wheat milling, mixing, and baking properties. Additional testing includes measurements of whole wheat ash, Polyphenol Oxidase activity (PPO), and dough extensibility. Whole wheat ash does vary between varieties and can substantially impact milling yield. PPO activity is responsible for many of the off colors that can develop in noodles over time and dough extensibility refers to the degree to which dough can be stretched prior to breaking.

Each test conducted provides greater selection information for the breeder and the results of the testing matters to wheat workers down the line – whether it be the seed broker, the farmer, the elevator, the miller, the baker or the consumer AND it matters to us.

2014 Wireworm Workshop
By Mike Ivie

The Ivie and Wanner labs hosted a Wireworm Identification Workshop over spring break. The interest was so high it filled before being announced! Ten Participants from Montana and Idaho heard talks by Frank Etlzer, a student in the Ivie lab, Michael Ivie and Anuar Morales, a student in the Wanner lab. The Insect ID teaching lab was used to allow participants to learn to use new identification keys written by Etlzer to identify both adult and

Attendees of the 2014 Wireworm Workshop. Back Row left to right: Amy Carroll, Gadi Reddy, Anuar Morales Rodriguez, Vickie Ophus, Ruth O'Neill, Frank Etzler, Shaohui Wu, Arash Rashed; front row - Erik Wenninger, Khanobporn Tangtrakulwanich, Laurie Kerzicnik and Mike Ivie.

larval specimens of economic species from our region. Participants came from MSU research and extension in Bozeman and Conrad, Idaho IAES stations in Kellogg and Aberdeen.

2014 Beekeeping Workshop
By Ruth O'Neill

The annual "Beekeeping Workshop for Beginners" was held on Saturday, February 22, in 108 PBB, with 47 new and prospective beekeepers attending. The workshop covered the basic information one needs to start beekeeping from scratch, including how to purchase bees and equipment, how to introduce a new package of bees to a hive, yearly hive maintenance, and honey harvest. Rick Molenda, from Western Bee Supply, set up a very nice trade booth in the lobby, where people could ask a lot of practical beekeeping questions, and could examine and purchase various types of beekeeping equipment and reference books. Many people ordered their equipment ahead of time to save on shipping costs, so the hallway was jam-packed with boxes ready for pick-up. Many thanks to Casey Delphia (Dept. of Ecology) for sacrificing her Saturday to help with set-up and clean-up, and for helping to carry those heavy boxes, as well as providing expertise on bees. Two extra volunteers who had attended the workshop in 2013 also showed up to help out in the morning. I'm sorry I can't remember their names to thank them properly here.

The morning session started off with an introductory talk on the biology of honey bees by Kevin Wanner (PSPP), followed by me (Ruth O'Neill, PSPP) presenting on hive establishment and maintenance over the course of a year. Cam Lay of the Montana Department of Agriculture completed the morning with a presentation of beekeeping regulations in Montana and a summary of services provided to beekeepers by the MDA. After lunch, Rick delivered a demonstration of hive components and how various beekeeping equipment, such as smokers and bee suits, is used. Jed Husby of Husby Apiaries, Bozeman, followed with a discussion of basic techniques for rearing queen bees. I finished the day with a quick summary of management practices for the control of *Varroa* mites, an important external parasite of bee brood. After the final talk, people gathered in the lobby area to chat and to eat bread and butter topped with Florida tupelo honey, Montana black sage honey, German rapeseed honey (which has a mustardy undertaste) and several other interesting and exotic varietal honeys.

Cam Lay, MT Dept Ag, talks about regulatory issues pertaining to honey bees.

Nine varietal honeys from all over the world were sampled.

Congressional Visits Day
By Steve Hystad

Earlier in February, I was informed that I had been selected, along with seventeen other graduate students, to receive the inaugural 'Future Leaders in Science' Award. This Award consists of a trip to Washington, D.C. to participate in the annual Congressional Visits Day hosted by the Crop Science Society of America (CSSA), Soil Science Society of America (SSSA), and American Society of Agronomy (ASA). The Congressional Visits Day is an annual event held in Washington D.C. which brings graduate students and scientists to the Capitol to meet with congressional and senate staff to raise awareness and support for agricultural science and research funding. On the first day of the event, my fellow graduate student participants and I were accompanied by certified cropping advisors and the organization's president Carolyn Olson (SSSA), Dave Mengel (ASA), and David Baltensperger (CSSA) to the American Association for the Advancement of Sciences (AAAS) headquarters to meet and speak with Dr. Sonny Ramaswamy, who serves as director of the National Institute of Food and Agriculture (NIFA). Dr. Ramaswamy described the details of his office which was created in the 2008 Farm Bill as replacement for the Cooperative State Research, Education, and Extension Service (CSREES). NIFA works with other government agencies, industry, and academia to award funds for a wide range of extramural research, education, and extension projects which serve the needs of farmers, ranchers, and agricultural producers. NIFA itself does not perform research in contrast to the intramural research agencies within the USDA, the Agriculture Research Service or the ARS. Federal funding in the wake of a federal shutdown in 2013 and budget cuts known as 'sequestration' left NIFA with $180 million less in 2013 than the previous year. The Agriculture Act of 2014, better known as the Farm Bill, increased federal funding for NIFA's budget by $69 million in comparison to 2012 or pre-sequestration levels. "Victory is short-lived in Washington," exclaimed Dr. Ramaswamy. With the FY 2015 president budget request received, congressmen/ women and senators are now tasked with creating their own budget proposals and evaluating where federal discretionary spending (funding not mandated by law) should be spent. Needless to say, March and April are a busy time for congressional staff as every interest group and lobbying effort

Karl Anderson and Beth Thomas presenting Steve Hystad with the Future Leader in Science Award. Karl and Beth both work for the CSSA-SSSA-and ASA science policy office.

descends on Washington to rally support for federal dollars to be appropriated to their own respective interest. As participants in the Congressional Visits Day, we were tasked with meeting congressional staff to

Steve Hystad on the steps of the Capitol Building.

raise support for increases in ARS and AFRI budget proposals by 2.4% and 15% respectively for FY 2015. USDA-AFRI is authorized to be funded up to $700 million but is currently funded at $316 million, while the ARS is currently funded at $1.112 billion dollars. Myself and another graduate student from North Dakota State University decided to pair up to meet with congressional staff from Montana and North Dakota. Most of the meetings with congress were with staffers tasked with advising their bosses about what issues and funding levels to support and which topics were most important to their constituents. However, we did get to meet with Senator Hoeven from North Dakota to discuss funding agriculture research at the ARS facilities in his state. Overall, Congressional Visits Day was an insightful experience about how the budget appropriations process works and an invaluable networking opportunity. I strongly urge any future and current graduate students who are interested in science policy to participate in the Congressional Visits Day in 2015. Furthermore, I strongly urge any faculty/ staff or student who has an opinion on how or the extent to which federal dollars should be spent on agriculture research and extension services in FY 2015, to contact their local and state congressman/women and senator.

Kumar Wins Award

Dr. Prashant Jha would like to announce that Mr. Vipan Kumar received 1st Position in Poster Contest and 2nd in oral presentation at the Western Society Weed Science Meeting.

Congratulations, Vipan!

Hannah Estabrooks Receives Award

Hannah Estabrooks

Hannah Estabrooks has received the Student Leader of the Year Award for her efforts as President of the Turf Club and for being an Ag Ambassador. This award recognizes a student organization leader who contributes to a club and its members, cultivates positive relationships with members, demonstrates commitment to the club mission/purpose and is actively involved in events and programs.

Congratulations Hannah!

Course Focus
AGSC 454 - Agrostology
Matt Lavin

Students in Range Science, Land Resources, and the various Biology degree options often have to learn how to identify grasses and grass-like plants (the "graminoids") as part of their studies of vegetation and restoration. AGSC 454 is designed to introduce students to about 150 of the most common graminoids that inhabit riparian, shrub-prairie, and disturbance-prone settings in Montana. Because almost 450 graminoid species are known from Montana, this course is designed to familiarize students with how to use taxonomic keys so that they can leave the course being able to potentially identify the many graminoids previously never seen. In order to use taxonomic keys successfully, however, students have to know how to sight identify, at least to some degree, a given plant not just to the species, but also to the genus, tribe (which is important for the grass family), or family. This is why about 150 common Montana graminoid species are introduced in AGSC 454. The ability to sight-

Close-up of the spikelet detail of western wheatgrass (about six of which occur in this view). The most diagnostic feature of this grass species is the long stout glumes with long narrowing tips that are slightly curved. The ecologically and morphological similar thickspike wheatgrass (Agropyron dasystachyum or Elymus lanceolatus) differs in having glumes that lack these long curved tips.

These sorts of ecological, morphological, and taxonomic detail that students learn in AGSC 454 are exemplified in these photos. This photo is a close-up of the leaves and stems of western wheatgrass (Agropyron smithii or Pascopyrum smithii). The clasping auricles, the small finger-like projections wrapping around the stem at the base of the leaf blade, are distinctive to many grasses in the wheatgrass tribe (Triticeae), including barley and wheat.

identify common species to family, tribe, genus, and species actually facilitates the use of taxonomic keys with unknown graminoid specimens. Such ability helps to create mental landmarks in the otherwise difficult and bumpy landscape of the world created by taxonomic keys. Without such mental landmarks, taxonomic keys are impossible to use. The taxonomic keys used in AGSC 454 are those in the "Manual of Montana Vascular Plants" by Peter Lesica. In addition, a smartphone app, Montana Grasses, is being developed by High Country Apps (http://www.highcountryapps.com/), and this will be available for class use (and by the general public) by summer 2014. This app will initially include over 100 of the most common graminoid species in Montana.

Students meet once a week on Monday afternoons during the fall semester. Confining the class to this time often enables people with full-time jobs to take the course (e.g., students who work for environmental consulting companies). The noon hour "lecture" is spent introducing the plant families, tribes, genera, and species that will be studied that afternoon. For lecture and lab, students are given about fifteen plant specimens that were collected during the previous summer when the grasses and grass-like plants were in flower. The afternoon is then spent mostly indoors preparing a reference set of plant species for that day. During the early part of the fall semester, part of the lab is held outdoors where students can see about 30 graminoid species in fall conditions, which are still intact enough to study the important reproductive and vegetative features.

Photographs of all of these species are taken so that the habitat and habit, as well as close-ups of important diagnostic traits can be readily accessed via a collection on www.flickr.com. These photographic collections are arranged by family and then by genus (e.g., http://www.flickr.com/photos/plant_diversity/collections/72157628191237539/). For the grass family, they are organized by tribe and then by genus (http://www.flickr.com/photos/plant_diversity/collections/72157630341509474/). These photos augment the approximately 150 plants species given to the students during the semester. Students can opt to make a taxonomically organized reference collection from these graminoid specimens, which can be taken with them at the end of the semester. Such a collection should be invaluable to those students working on Montana vegetation.

It is my hope that students who leave AGSC 454 will be able to make first-hand observations of the plant world and realize for themselves that there is not much of a difference between native and introduced graminoid species and that introduced grasses (e.g., smooth brome, timothy, Garrison creeping foxtail, etc.) are often the most invasive of all plants yet seldom attract the attention of citizens concerned about exotic invasives.

Montana Ag Live! Schedule for April

April 6 - Glenn Duff, Interim Dean, MSU College of Agriculture
"Creative programs, dynamic opportunities, and innovative thinking as MSU's College of Agriculture moves forward"

April 13 - Mark Hagerty, Economics researcher at Headwaters Economics
"Depressed rural economies and how the oil and gas boom could help stabilize rural Montana"

April 27 - Lorri Brenneman, Montana Department of Agriculture
"Agricultural Literacy Specialist looks at programs designed to teach the teacher about Montana's number one industry, Montana Agriculture"

Invited Talks

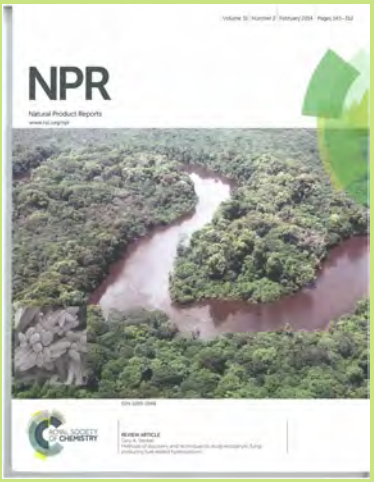
Barry Jacobsen, Gave talks on sugar beets at various locations in Japan. March 15-23.

Michelle Flenniken, "Honey Pathogen and Pathway Discovery", University of British Columbia, Vancouver, British Columbia, 2/26/14.

Linnea Skoglund and Laurie Kerzicnik gave workshops at the Wyoming Master Gardener Association and Wyoming Farmers Marketing Association joint state conference in Sheridan, WY on March 15. Linnea's talk was entitled "Integrated Pest Management of Common Diseases of Vegetables and Ornamentals" and Laurie's talk was "Insects and Woody Ornamentals".

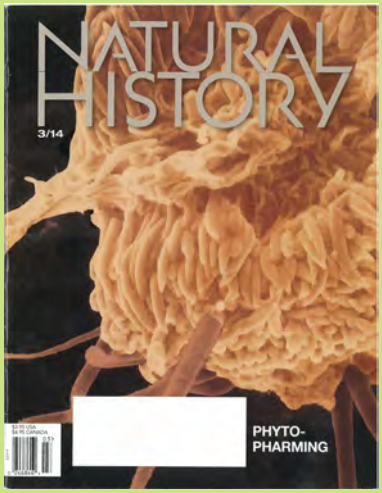
Laurie Kerzicnik was the invited speaker for the USDA/ARS in Sidney, Montana for their Brownbagger lunch series on March 21. Her talk was "Spiders as Biological Control Agents". She also gave a spider talk to Sidney High School's AP Biology class and a spider/insect talk to Rouse Elementary while she was there.

Publications



Strobel, G. "Methods of discovery and techniques to study endophytic fungi producing fuel-related hydrocarbons". NPR 31:259-272.

Also in this issue is a photo taken by Gary Strobel of the Central Guyanese Rain Forest. This review Journal has a Science Citation index of 9.8.



Strobel, G. "Microbe Mining, the Results of Looking for Endophytes in all the tough places". Natural History 3/14: 25-30.

Also in this issue, the cover photo was taken by Gary Strobel of an endophytic colletotrichum that produces an immunosuppressive peptide.

Grants

Tracy Dougher and Joe Bradshaw (Bozeman High School teacher), Protocol Development for Production of Montana Native Plants, M.J. Murdock Charitable Trust - Partners in Science Program ($15,000).

Kerzicnik Office Mates

Laurie Kerzicnik, Our Insect Diagnostician, just acquired some new officemates. She now shares her space with baby tarantulas (a Honduran Curlyhair, Trinidad Chevron, and a Texas Tan), a Caribbean Giant Centipede, a dune scorpion, and some hissing cockroaches. She's in Marsh 56 if you ever want to see or handle any of her new pets.

Hannah Bares handling the Honduran Curlyhair tarantula.

Extension TV
By Toby Day
Extension Horticulture

I recently attended the National Extension Conference in Sacramento, California as a representative of the Extension Master Gardener Program National Committee. Most of the conference seminars were on technology and social media and how Extension can use social media and new technologies to get their message to the masses. I have to admit that I was apprehensive going in about the value in social media. While I still think that face to face interactions with clients is important, my "old curmudgeon" values are slowly becoming a thing of the past. People are quickly changing the way that they get information, whether we like it or not.
I learned at the conference that people are looking more and more towards video content to get information. Google is still the number one search engine on the Internet, yet it may surprise you that YouTube is now the number two spot people search for information. In my world of extension horticulture, people are looking to video to

learn about pruning, soils, vegetable gardening, turfgrass and other ways to deal with consumer horticulture issues. Land grant universities across the U.S. are using video as a communication tool and some, such as the University of Nebraska-Lincoln, are putting it all together.

I would like to introduce Extension TV. http://extensiontv.unl.edu/. The folks at UNL have put together a website, similar to YouTube with a hint of Pinterest, to educate using unbiased, research-based video content on the web. No more searching through YouTube to find someone who is reputable to get information. Although the content is primarily from University of Nebraska Extension personnel and educators, I found that much of the content was relevant to Montana also. So, if you want to learn about pruning, soils, finance, or even ruminant digestion and methane (yep, it is explained in a great video), check out the new look of extension. The video on their homepage can tell you more about this valuable resource.

April Birthdays

Ryan Quire	8
John Sherwood	12
Mike Giroux	12
Toby Day	12
Matt Lavin	20
Andreas Fischer	25
Charles Hart	25
Nina Zidack	26
Rebekah VanWieren	28

Recipe of the Month

Italian Easter Pizza

1/2 lb bulk Italian sausage
Olive oil
1 (1 lb) loaf frozen bread dough, thawed
1/2 lb sliced mozzarella cheese
1/2 lb sliced cooked ham
1/2 lb sliced provolone cheese
1/2 lb sliced salami
1/2 lb sliced pepperoni
1 (16 oz) container ricotta cheese
1/2 c grated Parmesan cheese
8 eggs, beaten
1 egg
1 t water

Cook and stir Italian sausage in a skillet over medium heat until well browned, breaking up the sausage as it cooks, 5-8 minutes. Drain excess grease; set aside.

Preheat oven to 350. Oil the bottom and sides of a 10 inch springform pan with olive oil. Cut 1/3 of the dough off the loaf and set aside under a cloth. Form the remaining 2/3 dough into a ball and roll into a 14 inch circle on a floured work surface.

Line the springform pan with rolled dough, allowing dough to hang over the edge by 2 inches all around. Layer half of each of the following in the order given on to the crust: cooked Italian sausage, mozzarella cheese, ham, provolone cheese, salami, pepperoni, ricotta, parmesan, and eggs. Repeat one more time.

Roll out remaining bread dough into a circle-12 inch diameter; lay the piece over the pie to form the top crust. Roll and pinch the bottom crust overhang over the top crust to seal in the filling.

Beat 1 egg with water, brush the top of pie with egg wash. Bake for 50-60 minutes. Cover with foil for remaining baking time when top is brown. Check with toothpick. Allow pie to stand in the pan for at least 25 minutes before releasing the spring and removing pie from the pan. Transfer to a serving platter and cut into wedges for serving.