Plant Science Says

Happy Valentine's Day!

Volume 18, No. 1 The Department of Plant Sciences and Plant Pathology February, 2016

Plant and Animal Genome Conference
by Jessica Rupp

The Plant and Animal Genome Conference celebrated its 24th year January 9-15 at the Town and Country Hotel and Convention Center with nearly 3,000 scientists in attendance. There were 150 workshops to choose from and 1800 posters. The workshops on Saturday featured topics such as Triticeae genomics, legumes, and my personal favorite, sugarbeet. Sunday began with another round of workshops. For the final time, I presented my PhD work in a session focused on Applications of Transgenic Technology in agriculture. Other sessions of note included: QTL cloning, gene introgression, and solanaceae. There were also sessions which featured improvements in teaching, cacao genetics, plant chromosome biology, statistical genomics and many others on how to deal with "big data." Sunday evening ended with an outstanding plenary session featuring Dr. Allison Van Eenennaam. While her name may not immediately be familiar, some of her work certainly is. She is a biotechnology researcher and Extension Specialist at UC Davis. She has been involved in many active roles including the USDA National Advisory Committee on Biotechnology and 21st Century Agriculture. She was also a member of the group that evaluated AquAdvantage salmon, the first transgenic animal to be evaluated for the food supply. Her topic focoused on whether or not PAG innovations will be accepted. She provided accounts of unique experiences and inspiration for scientists moving forward in todays' scientific climate about communication. Other plenary speakers of note included: Erich Jarvis, Erez Lieberman Aiden, John Quackenbush, James M. Ostell, Jorge Dubcovsky, and Jan Leach. Workshops over various topics continued through Wednesday. There were over 130 different exhibits present, but the clear emphasis dealt with Next-generation sequencing.

Next year looks to be a year of celebration, with PAG turning 25, but to the disappointment of many, it will still be at the Town and Country! Those who were able to sneak away for a time could easily go visit the beach at La Jolla to see the seals. Also nearby is Scripps, which is always a great destination. Old Town San Diego is easily accessible by trolley for a quick dinner before the evening workshops. Overall, I would say it was another successful meeting and all who attended surely came home with new ideas! If only it had been a bit more sunny!

Schutter Diagnostic Lab 2016 Webinar Series
By Eva Grimme

The Schutter Diagnostic Lab and the Great Plains Diagnostic Network are offering the annual diagnostician webinar series. Webinars begin at 9:00 MST and are open to anyone who would like to attend. This is a great opportunity

to learn about the diagnostic network, diagnostic methods and resources, and current research. To join go to: **http://msuextensionconnect.org/gpdn2/**. Please sign in as a guest with your name and affiliation.

Contact Eva Grimme (994-5150, eva.grimme@montana.edu) for questions regarding this webinar series or how to connect. All webinars are recorded and can be viewed later at www.gpdn.org.

Date	Speaker	Title
1/13	Laurie Kerzicnik	Spiders: Friend or Foes
1/20	Joseph LaForest	Digital Resources for Diagnosticians: What we have and what is needed
1/27	Karen L. Snover-Clift	"STAR-D: Progress Update"
2/3	Daniel Cook	TBA - Poisonous Plant Topic
2/10	Joel Perez-Mendoza	Exotic Cicadellidae interceptions from Mexico at US ports of entry
2/17	Bright Agindotan	Seedborne Pathogens of Pulse Crops in Montana: The New and the Old
2/24	Febina Mathew & Taylor Olson	A Real-Time PCR Assay for detection and quantification of Diaporthe helian-thi
3/2	Emmanuel Bya-mukama	Wheat streak mosaic virus epidemics in the Great Plains: A review

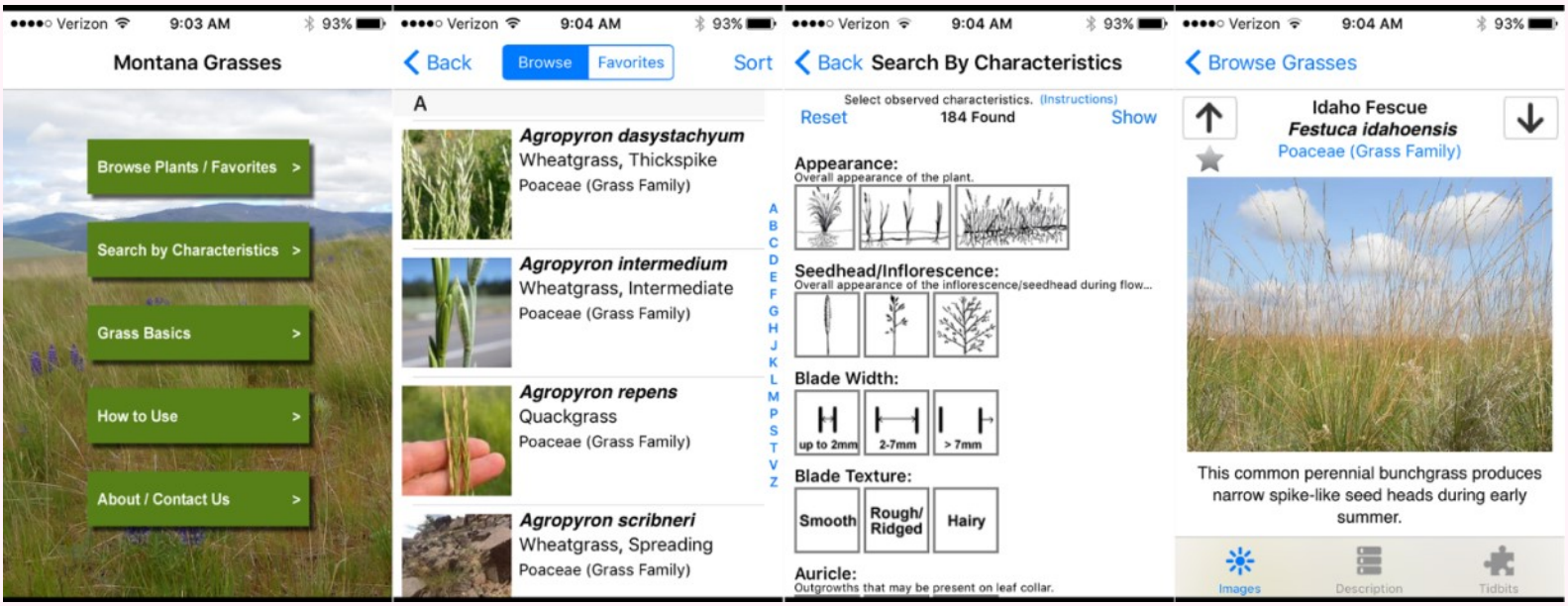
Course Focus
BIOB 280 - Magical Mushrooms, Miracle Molds: Fungi in the World Around Us
By Cathy Cripps

This is a new course designed to spark or promote an interest in fungi—one of the largest kingdoms of organisms on planet earth! Fungi affect our daily lives in so many ways, and yet most people are not aware of this. While the course is designed primarily for sophomores, it is also a fun course for juniors and even seniors. The goal of this course is to foster an awareness of fungi in the world around us, revealing how fungi function in nature, and how fungi have shaped past and present civilizations. Fungi may have initiated civilizations by turning nomadic tribes into agrarian societies that settled down, not to grow food, but to grow grain for alcohol produced by the fungus yeast. The historical aspects of fungi covered include brewing in ancient civilizations, ergot and witch persecution, the great Irish Potato Famine, the story of Penicillin and other antibiotics, the transformation of our forests by fungi, and how fungi have been used in ancient rituals as psychoactive substances in Aztec, Inca and Siberian culture. Fungi affect us as mold in our homes, as pathogens on our bodies, and as toxin producers in our food supply (peanut butter!). Yet for all the fear of fungi, they have huge benefits to our society as a source of medicines, antibiotics, industrial enzymes, myco-remediation tools, and even packing material to replace Styrofoam (myco-engineering). Mushrooms have been cultivated as food for hundreds of years and this course presents some of the more famous edibles such as morels, chanterelles, and truffles and takes a brief look at the deadly species. Current topics include "What's killing the Frogs?", white-nose syndrome in bats, and blue stain fungi carried by bark beetles. Some of the great fungal symbioses of the world such as the fungus-farming ants and mycorrhizal associations with trees highlight the interactive nature of fungi. Follow-up courses on fungi include Mycology (BIOM 423), Ecology of Fungi (BIOE 424), and Plant Pathology (BIOM 421) which are more for juniors and seniors.

Lectures are Tuesday and Thursday afternoons at 12:30 for this 3-credit course, and while there is no lab, examples of mushrooms and fungi are presented. Short announced quizzes complement three written exams, and one short presentation on "Fungi in the News". There is no textbook and reading material is posted on D2L.

Grasses App from High Country Apps
By Matt Lavin
(http://highcountryapps.com/MontanaGrasses.aspx)

An updated version of the Montana Grasses app will be available by the end of January 2016. The purpose of this app is to assist



interested individuals in the identification of 184 common and important grass and grass-like species (graminoids) that grow in Montana. This update will illustrate 154 species of grasses (Poaceae), 21 species of the sedge family (Cyperaceae), 8 species of rushes (Juncaceae), and one species of cattail (Typhaceae). Additionally, over 20 other graminoid species will be referenced and compared to the 184 species formally illustrated in this updated app. This will make possible the identification of over 200 species of Montana graminoids. This update includes photos and information related to the morphology and ecology of each species, as well as forage value and other important information particular to a graminoid species. This update to the Montana Grasses app represents the extensive collaboration of Katie Gibson and Whitney Tilt of High Country Apps, and Matt Lavin, Larry Holzworth, Jane Mangold, and Hilary Parkinson from Montana State University. The price: $4.99.

Plant Parasitic Nematode Identification Course
by Riyadh Al-Khafaji

After fall semester's classes ended, I attended a workshop from December 5-11 in Clemson, South Carolina at Clemson University. Along with lectures and labs, the class included social events such as hiking in the mountains. Dr. Paula Agudelo, a nematologist at Clemson University, was the professor in charge of the class.

We studied important plant parasitic nematode genera such as *Xiphinema, Longidorus, Trichodorus, Aphelenchus, Aphelenchoides, Bursaphelenchus, Criconemoides, Hemicriconemoides, Hemicycliophora, Pratylenchus, Heterodera* and many more. In addition, we studied Morphology, Biology, management principles, and extraction and sampling techniques. We did two identification exams and after each had the opportunity to hike or visit the botanical garden in Clemson. It

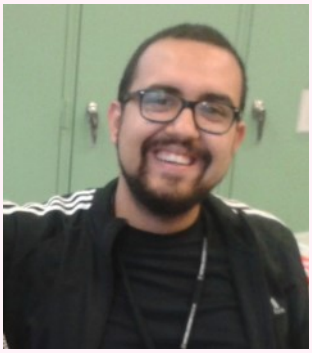
Clemson University Campus

Identifying Nematodes in Plant Parasitic Nematode Lab, Hoplolaimus spp.(LANCE), and Criconemoides spp.(RING)

was great to have many of my questions regarding plant parasitic nematodes answered.

Thank you to my advisor Dr. Alan Dyer, all my committee members, everyone in my lab, and Dr. Paula Agudelo for helping me achieve my dream of being able to identify plant parasitic nematodes.

New Graduate Students
Vinicius Ferreira (Mike Ivie)



My name is Vinicius Ferreira and I am a new graduate student here at Montana State University under Michael Ivie's supervision. I have a bachelor's degree in Biological Sciences from Universidade Cruzeiro do Sul and a master's in Systematic, Animal Taxonomy and Biodiversity from the Museu de Zoologia, Universidade de São Paulo, both institutions in Brazil. My major interest is in beetles and is centered in Taxonomy and Systematics of general Cantharoidea (Insecta, Coleoptera) with emphasis in Lycidae, specially the Leptolycini and the Calochromini, and in Telegeusidae. In my free time, I like to play videogames, read books, watch movies and go to restaurants with my wife and friends.

Durc Setzer (Mac Burgess)

I'm excited to be joining the PSPP Department this spring to pursue a Master's degree in Plant Science. I will be working with Mac Burgess and Zach Miller on a Cold Hardy Small Fruit variety trial. The trial is occurring at 4 locations around Montana, including a site at the Hort Farm in Bozeman. We will be comparing varieties and establishing crop production baselines to better allow specialty fruit producers to capitalize on these up and coming alternative fruits.

A native of Montana and Gallatin County, I received my undergraduate from MSU Bozeman last fall, 2015, in Sustainable Foods and Bioenergy Systems under the Sustainable Crop Production option. I am quite glad to remain within the College of Agriculture, where I have received assistance from and met so many wonderful people.

In the future I hope to work in an Extension capacity, as well as operate a specialty crop production enterprise. For now, I plan to continue enjoying all the great state of Montana has to offer with my wife Melisa.

Paula Guastello (Ryan Thum)

I'm a new Master's student in Dr. Ryan Thum's lab. I started my Bachelor's at Kansas State, and finished my degree last year here at Montana State. My background is primarily in Animal Science, but I decided to take a job in Dr. Thum's lab last summer after taking his and Dr. Lavin's Evolution course in the spring. Working in the lab showed me that my fascination with genetics and evolution is

irrespective of what organism I work with. It's pretty amazing how one course can change your life!

Most of my research will be focused around watermilfoil, an aquatic plant genus with species that are native and invasive to the States. These species are able to hybridize, and the hybrids tend to be more invasive, creating a unique challenge for the management of agricultural and recreational water bodies.

Outside of school and the lab, I'll primarily be found riding my horses, reading Isabel Allende, watching Red Sox games, or taking pictures of my cats. I'm excited to be able to stay in Montana a few more years, and look forward to my adventures both in and out of school!

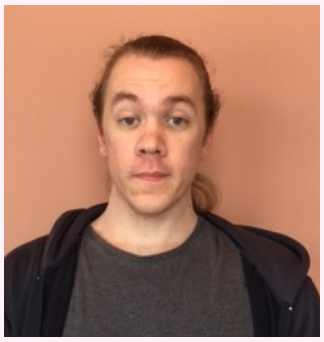
Ute Stuhr (Mary Burrows)

I'm a new graduate student in Mary Burrow's lab. Before defining my own research project, I'll contribute to the research Mary's group is working on this spring and summer. I'll take over field work and molecular analysis, investigating alternate hosts and management tactics on Wheat Curl Mite population dynamics and subsequent disease incidences caused by Wheat Streak Mosaic Virus.

Before I enrolled at MSU as a plant pathology student, I studied Biology at Martin-Luther-University Halle-Wittenberg, Germany. I graduated with a Masters of Science with a focus on Molecular Plant Physiology, working on plant development, nutrition and stress management in barley. During a five month research internship at the French National Institute for Agricultural Research (INRA) in Versailles, I discovered my Wanderlust that has now brought me to lovely Bozeman.

I love the great outdoors and find Montana the perfect place to enjoy that. I'm excited to go cross country skiing during snow season and hiking and camping during summer. Since my childhood, I have been a huge fan of horses and I'm looking forward to following this passion and sitting on a horse's back again soon.

Brandon Deily (Li Huang)



I'll be joining Li Huang's lab starting this spring semester to study host-pathogen interactions in wheat. I've lived in Bozeman for most of the past eight years and I graduated from MSU last spring with a B.S. in Plant Science. I look forward to learning more about the concepts and techniques involved in the study of Plant Pathology as I continue my education.

I have a few hobbies, my favorite of which is drawing. I've been practicing with pencil and paper since I was young, and lately I've been trying to learn how to use digital media as well. Some of my other hobbies include reading, writing, and programming. I also like to cook when I have the time. "

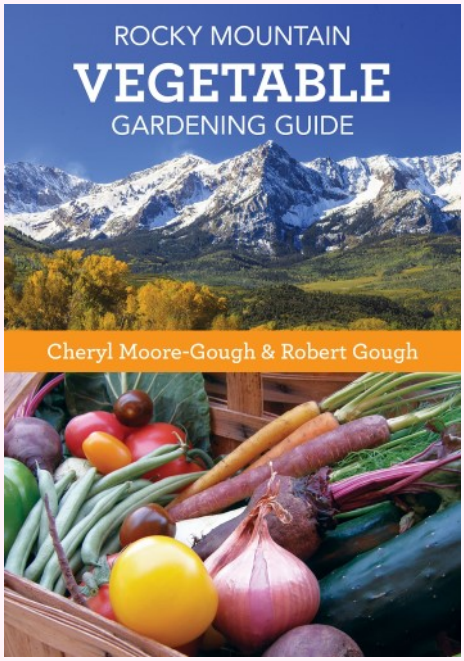
Alex Mc McMenamin (Michelle Flenniken)

I'm a new PhD student in Michelle Flenniken's lab. I've finished up rotations, and now I am really getting into the stuff that makes me tick: honey bees! I'm very interested in viruses that infect honey bees, including their pathogeneses, epidemiology, and how bees cope with infection.

I grew up in urban Philadelphia, and earned my B.S. in Immunology and Infectious Disease as well as my M.S. in Entomology at Penn State. Until I visited Bozeman the first time, I had never been further west than Pittsburgh.

Bozeman is turning out to be a fantastic place to live because although I've never skied, I love to hike and snowshoe. I really look forward to doing some long hikes in Montana where I can scope out the local insect life (Hello Grylloblattids)!

Updated Vegetable Gardening Book Released
By Cheryl Moore-Gough



When several publishing houses were being consolidated, Cool Springs Press was purchased and Bob Gough's and my 2008 book, Guide to Rocky Mountain Vegetable Gardening was taken out of print. I thought it was an excellent book, as did the publishers of my most recent book, Montana Gardener's Companion, Globe Pequot. Last year, I obtained the copyright and set to work on the January, 2016 release of the Rocky Mountain Vegetable Gardening Guide. With completely new photographs that I took in my garden, the MSU Hort Farm, neighbor's yards, and other locations in the Gallatin valley, it has a new look as well as updated information. This version also includes the Rockies of New Mexico, which were not included in the previous edition. I just had to include Bob as co-author of this edition since many of the words are his. I think it's a great way to honor his contribution to gardening in Montana and the Rocky Mountains.

Invited Talks

Mac Burgess, Northern Plains Sustainable Agriculture Society Winter Conference. "Vegetable Variety Evaluation for the Northern Plains - Montana 2015", Aberdeen, SD, January 22, 2016.

Gary Strobel, Rory Francis of the Canadian Bioalliance and Bryan Blatt of Endophytics (Bozeman).

Gary Strobel, Bioalliance of Prince Edward Island, Canada. "Endophytic Microorganisms". December 1-5, 2015

The Bioalliance will soon begin sponsoring a major program to discover novel bioactive molecules from natural sources and one of the target sources are the endophytes of Canada. I met with university, government and private sector scientists and outlined strategies that would help them be successful in their endeavors. As a side bar, the Bioalliance was also interested in discussing the discovery of the S-x technology with Strobel and Mr. B Blatt that has been so successfully used to treat scours in calves, foals, pigs, dogs and sheep. The Bioalliance of PEI is a quasi- government agency that promotes the discovery of new products and helps all aspects of start- up businesses in Canada. Since early December there have been on- going discussions with the Bioalliance about establishing a method to get S-x into Canada and sold as a product by a Canadian affiliate company.

National and State Master Gardener Data
By Toby Day, Extension Horticulturist

I currently represent the Northwest region (Montana, Idaho, Wyoming, Washington, Oregon, Alaska and Hawaii) on the Extension Master Gardener National Committee. In 2015, the committee completed a national survey of states to determine the value of Master Gardener volunteers.

Locally, you can find Master Gardener volunteers answering questions at the MSU Extension Master Gardener booth at the farmer's market, answering questions at the MSU Extension plant clinic, planting and tending to the gardens at the Story Mansion and the Plant Select garden at the Bozeman Public library; volunteering with the Eagle Mount gardening program, pruning and weeding the orchard and iris garden at the Hort Farm, and maintaining the Mathre Courtyard – just to name a few. Add that to the volunteer efforts of Master Gardeners in all Montana Counties and you can see the huge value volunteers add to their counties, the state and ultimately, the nation.

So on to some statistics. First, let's look at Montana where 30 of the 56 counties reported. Last year, there were over 300 newly trained Master Gardeners and currently there are over 700 active Master Gardeners. Those volunteers logged 11,724 volunteer hours in 2015 with a value to the public of $270,703 (calculated using volunteer values at www.independentsector.org). Those numbers are only what is reported online (and, as we have found out, Master Gardeners are not great at reporting all of their hours). A conservative estimate is that the program value is well over $350,000!

Nationally, there were 36 states reporting (72%). The final tally revealed that there were 83,389 active Master Gardener volunteers in the U.S. in 2014. In that time, Master Gardeners logged a whopping 5,293,130 hours of volunteer time, making Master Gardener one of the largest and most active national volunteer programs. Agents and educators trained over 14,000 new Master Gardeners with an average of over 40 hours of consumer horticulture training per volunteer. They cultivated over 1,047,000 direct contacts (those that ask direct questions to Master Gardeners) and have a reach of over 51,000,000 contacts using media and social media (TV, radio, newspaper, Extension publications, and social media such as Facebook, Twitter, Instagram, Pinterest, etc.). It is estimated that they also volunteered in nearly 5,700 community gardens nationwide and donated over 1,300 tons of produce to local foodbanks and pantries.

Master Gardeners volunteering at the Story Mansion

Those are so many great numbers! And, with only 36 of the 48 states that have an active Master Gardener program reporting, the numbers are convincingly higher. I am proud of what they do locally, state-wide and nationally to guide and inspire people, increase yard and garden health, and ultimately beautify landscapes. This is all achieved by the great Extension work of the many people who have helped develop this program.

Recipe of the Month

Roasted Yam and Kale Salad

2 yams, cut into 1-inch cubes
2 tablespoons olive oil
salt and freshly ground black pepper taste
1 tablespoon olive oil
1 onion, sliced
3 cloves garlic, minced
1 bunch kale, torn into bite-sized pieces
2 tablespoons red wine vinegar
1 teaspoon chopped fresh thyme

Preheat an oven to 400 degrees F (200 degrees C). Toss the yams with 2

tablespoons of olive oil in a bowl. Season to taste with salt and pepper, and arrange evenly onto a baking sheet.

Bake in the preheated oven until the yams are tender, 20 to 25 minutes. Cool to room temperature in the refrigerator.

Meanwhile, heat the remaining 1 tablespoon of olive oil in a large skillet over medium heat. Cook and stir the onion and garlic until the onion has caramelized to a golden brown, about 15 minutes. Stir in the kale, cooking until wilted and tender. Transfer the kale mixture to a bowl, and cool to room temperature in the refrigerator.

Once all the ingredients have cooled, combine the yams, kale, red wine vinegar, and fresh thyme in a bowl. Season to taste with salt and pepper, and gently stir to combine.

February Birthdays

Jeff Johnston	2
Carmen Murphy	14
Alan Dyer	15
Phil Bruckner	17
Niranjan Aryal	22
Pam Szelmeczka	23
Hwa-Young Heo	24