Plant Science Says

Happy Valentine's Day!

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VanWieren Receives Award

On January 10, Rebekah VanWieren, Assistant Professor in the Department of Plant Sciences and Plant Pathology, won the President's Award for Excellence in Service Learning. The award recognizes a faculty member and community partners who use a service learning activity to meet a community need.

VanWieren is one of just two faculty dedicated to teaching landscape design courses, and she excels at integrating service learning into the capstone course for landscape design students. This integration enables students to obtain relevant experience while instilling civic responsibility.

An example of a service learning integration project VanWieren designed is one where her landscape design students created and implemented a trail master plan for Missouri Headwaters State Park, partnering with Sacajawea Audubon Society, CRHUS, and Montana Fish, Wildlife, and Parks. Her students utilized their knowledge and abilities in site and planting design gained through previous coursework to develop their plans. The experience involved interacting with the public, other design professionals, and city and park officials. It also involved preparing preliminary and final plans, cost estimates, and gathering feedback at stakeholder workshops.

Community partners say that VanWieren and the students played a large role in enabling the first phase of construction of the trail project last fall: "Their plans and graphics provided us with an effective tool we could use to promote our project, secure some much needed grant funding, and give our landscape architect a starting point to finish working drawings and secure permits to get our project off the ground."

Interim Executive VP for Academic Affairs and Provost Robert Mokwa, Rebekah VanWieren, and President Waded Cruzado.

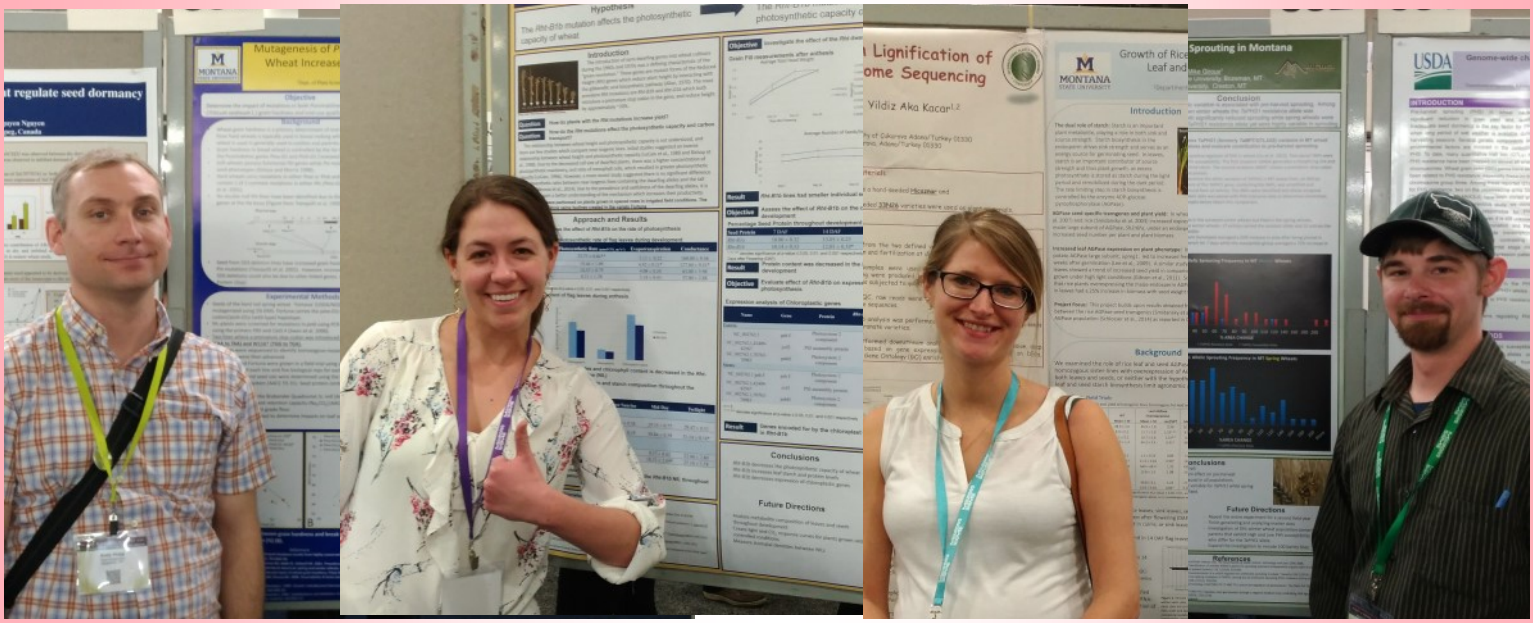
Colleagues say the service learning projects VanWieren leads are important and have a positive impact because they allow students to recognize and respond to real world design challenges and make a difference in their landscapes. They also praise her ideas, her communication and her dedication.

Congratulations Rebekah!

PAG Conference

By Jason Cook and Andrea Varella

The International Plant and Animal Genome (PAG) Conference was recently held this past January in sunny San Diego, California. The conference serves as a forum for researchers and companies from around the world to



Andy Hogg, Emma Jobson, Alanna Oiestad, and Justin Vetch at the Plant and Animal Genome Conference.

gather and disseminate research findings via presentations, posters, workshops, and exhibits. Additionally, the conference provides an excellent meeting place for researchers to form and plan collaborations among academic and private institutions. Subject matter presented at the conference was broadly focused on basic and applied genetic and genomic research spanning a large number of plant and animal species.

Among the species present at the conference, the wheat and barley research community was well represented. Because of this, several members of the Plant Science and Plant Pathology wheat and barley research community attended the conference including Brittany Brewer, Hikmet Budak, Jason Cook, Hannah Estabrooks, Mike Giroux, Andy Hogg, Emma Jobson, Alanna Oiestad, Jamie Sherman, Luther Talbert, Andrea Varella, and Justin Vetch.

Participants from the Plant Science and Plant Pathology department presented posters on several research topics including the identification of new genes for wheat stem sawfly resistance, physiological effects of a dwarfing gene in wheat, pre-harvest sprout tolerance in Montana wheat, wheat end-use quality, and the interdependence of increased starch biosynthesis in leaf and seed tissue with nitrogen levels needed to increase yield in rice. Additionally, Hikmet Budak gave a presentation in the Systems Genomics session titled "A large Scale microRNA and long-noncoding RNA annotation and network analysis in plants".

Graduate students met researchers that had been working on research topics similar to their own for a number of years and they were able to provide valuable insight into how the students could improve or expand their projects. Lastly, the conference provided an opportunity for the graduate students to see how large and diverse the plant genomic research community is, thus demonstrating the vast opportunity we have for solving difficult challenges in securing our food supply.

Schutter Diagnostic Lab 2017 Webinar Series
By Eva Grimme

The Schutter Diagnostic Lab and the Great Plains Diagnostic Network are offering their annual webinar series addressing topics ranging from *Phytophthora* sp. research to IPM for fruit trees to turf problems. This year, two of our own experts gave webinars: Noelle Orloff, January 25 and Dr. Cathy Cripps on February 1. The webinar series began January 18, 2017, 9:00 MST, and is open to all interested individuals. This is a great opportunity to learn about the

diagnostic network, diagnostic methods/ 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
2/08	Dr. Tamra Jackson-Ziems University of Nebraska-Lincoln	"Introduction to Bacterial Leaf Streak Disease of Corn"
2/15	Dr. Diane Alston Utah State University	"IPM for Primary Insect Pests of Apple and Cherry"
2/22	Dr. Febina Mathew & Paul Okello South Dakota State University	"*Fusarium* spp. interacting with soybean cyst nematode on soybean"
3/01	Dr. Jim Stack Kansas State University	TBA
3/08	Dr. Megan Kennelly Kansas State University	"Solving turf puzzles - It's not as bad as you think!"

Giroux, Jobson, and Vetch Participate in Science Olympiad
By Mike Giroux

On November 22, Emma Jobson, Justin Vetch, and I were volunteers with the Montana Science Olympiad (MTSO). The MTSO works to improve science education and student interest in science via competitions in different science-related disciplines. We three volunteered to work on a food science unit along with food science unit team captain Coleen Kaiser. Coleen is a registered dietitian and instructor in the Health and Human Development Department at MSU. Our collective goal was to prepare an event for

Emma Jobson and Justin Vetch

30 teams of two students from middle schools across Montana. Each team selected food science as one of their Olympiad events and came to MSU prepared to test their knowledge of food science. Each team also came prepared to test their homemade calorimeters, which basically were set up to measure the amount of heat given off by a piece of burning food. Emma and Justin's task before the day began was to figure out activities that would test the student's knowledge of calorimetry and food science. Through extensive experimentation (and some snacking) it was determined that puffy Cheetos burn wonderfully well. On the day of the Olympiad, we all donned our special volunteer shirts and met our students in the Herrick Hall Food Lab. In the 45-minute period allotted for each group of teams, each two-person individual team had to complete a two-page test on food science, test their calorimeter and calculate the calorie content of a Cheeto, and test the starch content of a group of foods. The teams of middle school students were all very serious and worked with almost no wasted time or horsing around and amazingly completed all the tasks within the allotted time. I know that each of us felt that volunteering with the MTSO was an enjoyable experience and found it gratifying to see a group of 60 middle school students excited about science.

Recent Graduates

Carmen Murphy, Ashish Adhikari and Nar Ranabhat, recently received their master's degree. Carmen's advisor was Mary Burrows and she received her Master's in Plant

Carmen Murphy and Advisor Mary Burrows at Carmen's graduation ceremony.

Pathology. Carmen is now pursuing a Ph.D. in Plant Sciences with Mary Burrows as her advisor.

Nar Ranabhat successfully defended his thesis for a Master's in Land Resources and Environmental Sciences and is currently seeking a position in Bozeman. His advisors were Mary Burrows and Fabian Menalled.

Ashish Adhikari received his Master's in Entomology and is currently seeking a position in Florida where his wife is pursing a PhD. His advisors were Mike Ivie and Gadi Reddy.

Congratulations to all!

Course Focus
HORT 435: Landscape Planning Studio
by Rebekah VanWieren

What types and where should specific green infrastructure strategies, like infiltration basins or green streets, be planned throughout a city? What are the design and planning recommendations for a 2030 PROST (Parks, Recreation, Open Space, and Trails) vision? Or, what areas within a growing region are most suitable for land conservation or agricultural production? These are questions that we explore in HORT 435. This course serves as an upper division studio course in the Landscape Design option and will be offered alternating spring semesters with HORT 440: Urban Design studio.

This new course was proposed in 2016 to help fulfill the need for students in the landscape design curriculum to build an understanding of landscape design issues and concepts at macro - and meso-scales. When communities or regions develop plans and policies that inform future land use, landscape designers are typically part of the interdisciplinary work of investigating impacts on and value of the natural biophysical factors, ecological processes and patterns, and landscape aesthetics at play.

The first studio project focuses on analyzing the ways in which biophysical characteristics (slope, soils, hydrology, climate, vegetation, etc.), along with cultural and economic characteristics, may be integrated with growth scenarios for the Bozeman-Belgrade-Gallatin Gateway area. In a final report format, students develop a series of maps and plans that demonstrate the rationale and recommendations for multi-purpose greenways, parks, and conservation areas. During the second half of the course, students will create a framework for designing green infrastructure at an intermediate scale in Butte, Montana. Students will be challenged to plan for the future opportunities of an interconnected system of trails, parks, bioswales, rain gardens, and urban forestry strategies. The final deliverable will include posters with maps, illustrative drawings, technical annotation, and a verbal presentation.

Finally, one of my favorite assignments is for extra credit. Students are encouraged to attend any planning-related public meeting (I warn them about the occasional four plus hour City Commission meetings) and write a summary based on course concepts. I'm looking forward to seeing which eager students participate!

Invited Presentations
Michelle Flenniken will present "What's Killing the Bees? The Impacts of Pathogens and other Factors on Honey Bee Health" as part of Café Scientifique on Tuesday, March 28, at 6:00 p.m. at the Baxter Hotel Ballroom in downtown Bozeman. The event is hosted by MSU and co-sponsored by its INBRE and COBRE programs. It is free and open to the public.
http://www.montana.edu/news/16691/honey-bee-health-to-be-discussed-at-march-28-caf-scientifique#.WIpG_kLjkEo.email

Invited Lectures
Gary Strobel, Indigo in Boston, MA. "Chemistry and technological promise of endophytes". Indigo is a plant-based biotechnology company organized around the concept of improving plant yields by reducing biological and negative environmental influences that affect the plant and its yield. They work mainly with endophytic microbes that are eventually applied to seeds of major crop plants including wheat, corn, soybeans and others. They are endowed with $152 million and are in the hiring and initial development mode.

Grants
Jamie Sherman, Brewer's Association, "Stable and sustainable dryland production of high quality malt barley"

Mary Burrows, USDA, "Montana State University's Extension Implementation Plan for Integrated Pest Management"

Nina Zidack, Montana Department of Agriculture, "Equipping MSU Potato Lab for ELISA and IC-PCR"

Jessica Rupp, Montana Department of Agriculture, "Potato Improvement Through Precision Genome Editing Year 2"

Luther Talbert, Jason Cook, Hikmet Budak, and Jamie Sherman, University of California - Davis, "Coordinated Agricultural Project (WheatCAP): Validation, characterization and deployment of QTL for grain yield components in wheat"

Montana Wheat and Barley Grant Recipients**:**
Phil Bruckner
Hikmet Budak
Mary Burrows
Jason Cook
Alan Dyer
Bill Dyer
Andreas Fischer
Mike Giroux
Deanna Nash
Jack Riesselman
Jamie Sherman
Luther Talbert

Equipment Awards
The following faculty received equipment awards: Jennifer Britton, Mac Burgess, Phil Bruckner, Hikmet Budak, Mike Giroux, Jessica Rupp, and Jamie Sherman.

Publications
Chaofu Lu—The Biodiesel magazine recently published the online article that was on the MSU home page regarding the research that Chaofu is doing to improve camelina. If you would like to know more about Chaofu's research please go to: camelina.http://biodieselmagazine.com/articles/2147923/montana-state-university-scientist-wins-grant-to-improve-camelina

Charles Hart and Mike Ivie, "A Revision of the Genus Diastolinus mulsant and rey (Coleoptera: Tenebrionidae)". Coleopterists Bulletin.

Henry S. Nzioki, Florence Oyosi, Cindy E. Morris, Eylul Kaya, Alice L. Pilgeram, Claire S. Baker, David C. Sands, "Striga Biocontrol on a Toothpick: A Readily Deployable and Inexpensive Method for Smallholder Farmers", Frontiers in Plant Science.

Katelyn E. Mason, Jonathan K. Hilmer, Walid S. Maaty, Benjamin D Reeves, Paul A. Grieco, Brian Bothner, Andreas M. Fischer, Plant Sciences & Plant Pathology, Chemistry &

Biochemistry, "Proteomic comparison of near-isogenic barley (Hordeum vulgare L.) germplasm differing in the allelic state of a major senescence QTL identifies numerous proteins involved in plant pathogen defense", Plant Physiology and Biochemistry 109: 114-127.

Ivie, M.A., N. P. Lord, I.A. Foley and S.A. Ślipiński. Colydiine genera of the New World: a key and nomenclatural acts 30 years in the making (Coleoptera: Zopheridae: Colydiinae). Coleopterists Bulletin 70: 755-788.

Lord, N.P., and M.A. Ivie. Several new genera and species of New World Synchitini (Coleoptera: Zopheridae: Colydiinae). Coleopterists Bulletin 70:715-753.

Hart, C.J. and M.A. Ivie. Two new species of / Xerolinus/ Ivie and Hart (Coleoptera: Tenebrionidae: Opatrini) from Jamaica and the Virgin Islands. Coleopterists Bulletin 70: 885-891.

Ivie, M.A., and C.J. Hart. Redefinition of / Diastolinus/ Mulsant and Rey, with a review of West Indian blapstinoid genera (Coleoptera: Tenebrionidae: Opatrini). Coleopterists Bulletin 70: 447-481.

Hart, C.J. and M.A. Ivie. Revision of the genus / Diastolinus/ Mulsant and Rey (Coleoptera: Tenebrionidae). Coleopterists Bulletin 70: 485-540.

Ferreira, V.S., and M.A. Ivie. Redescription of / Cephalolycus/ major Pic, 1926 (Coleoptera: Elateroidea: Lycidae) and a discussion on its taxonomic position. Coleopterists Bulletin 70: 663-666.

Jessica L. Shoup Rupp, Luisa F Cruz, Harold N. Trick, John P. Fellers. RNAi-Mediated, Stable Resistance to Triticum mosaic virus in Wheat, Crop Science.

Xie, J., Strobel, G.A. Xu, W-F., Cehn, J., Ren, H-S., An J., and Geary, B. (2017) Fungi as architects of the rimstone dams in HungLong, NSD, Sichuan, China. Microbial Ecology 73: 29-38.

Vincent Pujol, Jose Robles, Penghao Wang, Jen Taylor, Peng Zheng, Li Huang, Linda Tabe, Evans Lagudah, "Cellular and molecular characterization of a stem rust resistance locus on wheat chromosome 7AL", BMC Research Notes

Gary Strobel: Microbial Ecology, COVER PHOTO for Volume 73, Number 1 2017: The HuangLong park area of the Sichuan province of China is a unique scenic area of the world. It is known for its thousands of aquamarine colored pools that are formed behind naturally formed dams of travertine (calcite) along a cold water stream. The travertine, based on its crystalline structural analysis, is of biological origin. Fungi and bacteria were discovered associated with both leaves associated with the calcite dams as well as in the older parts of well-established dams. Several species of Phytium, a phycomycete and an endophyte, accounted for over 45% of all of the fungi successfully isolated from the well-established dam samples and at least 85% in the floating leaf samples. Saprolegnia sp. (Phycomycete) along with Phoma sp. (Ascomycete) were noted along with Mortierella sp. as other dam associated fungi. The fungal hyphae observed on dead leaf material as well as in the calcite dams directly served as nucleation points for the formation of crystalline CaCO3 (see inset showing calcite crystals associated with hyphae) . Eventually these crystals grow large enough to fuse to make calcite plates which form the main structural feature of

all of the travertine dams in this area. Interestingly, each of the individual crystals associated with the dams has an associated hole in its core where a fungal hypha used to reside as observed by scanning electron microscopy. (see article in this issue by Xie et al.) Photo courtesy of Jie Xie State Key Laboratory of Silkworm Genome Biology, College of Biotechnology, Southwest University, Chongqing 400715, PR China and Gary Strobel Department of *Plant Sciences.*

Gardening Fix in February?
By Toby Day, Extension Specialist
February often signals the beginning of the garden season for many Montana gardeners. Sure, there is still feet of snow out there and one can't even see the garden, but the seed catalogues have all been received, plant and seed orders are being made and dreams of designing and planting are in most every gardener's thoughts. I start to go "garden crazy" sometime in February.

How do I get my gardening fix this time of year? I prepare. I know when the gardening season is upon us, I will be too busy to do things such as clean and sharpen my garden tools. There is a valuable fact sheet from Wisconsin Horticulture that explains tool maintenance well: http://hort.uwex.edu/articles/maintaining-lawn-and-garden-tools/.

I also want to construct those cold frames that I have wanted to build each year. By the time spring comes around, I am often too busy to build them, and I go one more year with all the materials stacked by the shed.

By the way, there's a MontGuide on cold frames if you don't know what I am talking about: http://www.msuextension.org/publications/YardandGarden/MT199803AG.pdf.

February is also the time that I catalogue my fertilizers, pesticides, pots, trays and all my other gardening equipment and materials and make a list of what I will need this year. If I don't, I often buy too much or too little of one item or another.

If you really want to just get your hands dirty and want to *plant* something, now would be a good time to repot your houseplants. I know it's not the garden, but it does give you that *sense* of gardening. Besides, spring is the best time to transplant those root-bound and over grown plants often forgotten in summer. A good resource for houseplant care is a fact sheet from the University of Missouri Extension http://extension.missouri.edu/p/G6510.


A Chinese evergreen in need of repotting.

Many of you have ordered and received your vegetable garden seeds already and have visions of starting some transplants. I wouldn't just yet – it is a little too early. However, there is one exception: onions sets. Onion sets should be started at least 10-12 weeks before the beginning of the garden season. Since onions can go in the garden in early summer, many gardeners start their onions in February. Using pre-grown onion sets is the best way to ensure that you get large bulbs for storing at the end of the summer (as compared to direct seeding). Sow the seeds ¾" deep and keep them moist. Oftentimes, you just need to put the transplants in a bright window sill away from

Onion sets started indoors

direct light and they will do just fine. When you are ready to transplant, simply pull the individual plants apart from one another, trim the roots to ½", cut the tops to 4", and plant them a couple of inches deep in rows in the garden about 3"- 4" apart. A good resource for growing onions in the garden is from the University of Minnesota Extension: http://www.extension.umn.edu/garden/yard-garden/vegetables/growing-onions-in-minnesota-home-gardens/#planting
Spring and summer is just around the corner (even though it doesn't seem that way?). Anything you can do now to prepare for the busy times in the garden, the better off you will be. At least that works for me.

Recipe of the Month
Contributed by Deanna Nash – yummy!
Peanut Butter Cup Cookies

1 3/4 cups all-purpose flour
1/2 teaspoon salt
1 teaspoon baking soda
1/2 cup butter, softened
1/2 cup white sugar
1/2 cup peanut butter
1/2 cup packed brown sugar
1 egg, beaten
1 teaspoon vanilla extract
2 tablespoons milk
40 miniature chocolate covered peanut butter cups, unwrapped

Preheat oven to 375 degrees. Sift together the flour, salt and baking soda; set aside.

Cream together the butter, sugar, peanut butter and brown sugar until fluffy. Beat in the egg, vanilla and milk. Add the flour mixture; mix well. Shape into 40 balls and place each into an ungreased mini muffin pan.

Bake at 375 degrees for about 8 minutes. Remove from oven and immediately press a mini peanut butter cup into each ball. Cool and carefully remove from pan.

February Birthdays

Jeff Johnston	2
Norm Weeden	12
Carmen Murphy	14
Alan Dyer	15
Phil Bruckner	17
Huang Li	22
Niranjan Aryal	22
Pam Szelmeczka	23
Hwa Young Heo	24

Norm Weeden Retires
Dr. Norm Weeden, former Department Head and Professor, retired as of December 31, 2016. Norm says, "Cathy and I would like to thank all of you for such a wonderful send off. It has been an honor to be part of this department and my pleasure to be working with such a great group of colleagues and staff. Cathy and I intend to be around for some time, and we look forward to seeing all of you on the slopes or trails if not in the halls of PB or LJH."

Congratulations on your retirement Norm!

Please go to next page for more news and photos.

John Sherwood giving Norm Weeden a certificate and blanket from the Alumni Foundation.

Norm and Cathy Weeden

Priyanka Weds!
Priyanka Kudalkar (Schutter Diagnostic Lab) and Neeraj Gurdasani were married on December 18 in Mumbai, India.

The engagement party where I am wearing a traditional Indian 'lehenga' and Neeraj is wearing a 'Sherwani' .

Priyanka and Neeraj at their engagement party with with grandparents.

The traditional Hindu ceremony—2.5 hours!