Plant Science Says

Happy St. Patrick's Day!

Volume 19, No. 2 The Department of Plant Sciences and Plant Pathology March, 2017

Outstanding Horticulture Students Recognized

ASHS Collegiate Scholars - This award honors the academic achievements of junior and senior undergraduates from departments of horticulture, or plant and crop science, who are majoring in horticulture. Students must be in the top 15% of their class, based on academic standing and are selected on the basis of their scholarship achievements, leadership abilities, participation in campus/ club activities, and services to their departments. Students are recognized in the April issue of the ASHS newsletter.

ASHS Collegiate Scholars
Dylan McDowell
Maggie Crowley
Cara Still
Tanner McAvoy
Alisha Bretzman

Outstanding Undergraduate Horticulture Student - The ASHS Outstanding Horticulture Student Awards officially recognizes exceptional undergraduate horticulture students in baccalaureate programs. Students enrolled in horticulture or in a plant science/crop science department with an emphasis or major in horticulture are eligible. Students are selected on the basis of their academic achievements, leadership abilities, participation in campus/club activities, and service to their departments. Students are recognized in the April issue of the ASHS newsletter.

ASHS Outstanding Undergraduate Horticulture Student - Cara Still
Cara is a Fall 2016 graduate in Environmental Horticulture Sciences. She grew up in Corvallis, Oregon on a small piece of land large enough for a home garden and a small orchard. Growing up, her curiosity in Horticulture was constantly piqued by experiences in the garden and the 'Green Thumbs' in her family. When Cara started growing orchids in high school, she knew this was what she wanted to do with her life. While at MSU she continued her interest in orchids by developing a micropropagation lab exercise for the Advanced Plant Propagation class. Cara also received valuable laboratory experience working in the lab of Dr. Ryan Thum on several projects related to the evolutionary and molecular ecology of invasive aquatic species. Cara was active in a variety of extracurricular activities, including the College of Agriculture Ambassador program and the Residence Hall Association. In addition, Cara served as a Teaching Assistant for two courses and received her Certified Plant Professional certification from the Montana Nursery and Landscape Association.

Sugarbeet Annual Meeting and National Sclerotinia Initiative
By Myron Bruce, Postdoc, Rupp lab

In January, I attended the Sugar Beet Research and Education Board's annual reporting meeting in Fargo, North Dakota, where I presented results from our 2016 field trial. We tested the effects of different seed treatments and foliar spray timings on *Rhizoctonia* crown and root rot control. The meeting was very informative for me as a sugar beet neophyte and it was well attended. Nearly 200 researchers, producers, and industry representatives were in attendance. Results from diverse areas of sugar beet research were presented,

including herbicide-resistant weed management, disease control, remote sensing, and sustainable production. It was nice to make new contacts, discuss potential future collaborations, and share our research – despite being in Fargo in January.

The following week, I flew to Minneapolis, Minnesota to attend the National Sclerotinia Initiative (NSI) reporting meeting. We did not have research to present at this meeting, but we did want the group to know that we are interested in pursuing *Sclerotinia* research in the future. As Montana continues to increase acreage dedicated to pulse production, white mold (caused by *Sclerotinia sclerotiorum*) will be a larger threat to profitable production. This meeting was very informative in regard to the state of *Sclerotinia* research in the United States, the diversity of hosts (it causes three different diseases in sunflower alone), and how to write a good proposal for NSI funding. I also had the opportunity to become acquainted with several research groups that focus on white mold.

Under other circumstances, Dr. Rupp would have attended these meetings. However, she had prior obligations (including the Malt Barley and Sugar Beet Symposium in Billings, which she helped to plan). I am grateful for her trust in my ability to represent our lab at these meetings. I look forward to representing our lab and our research at future scientific meetings.

At the "After Party" evaluating over pizza were (from left): the student organizers, Teo Gould, Claire Zahner, Elizabeth Boudreau; founding organizer Florence Dunkel; the guest speaker, Robert Nathan Allen founding CEO of Little Herds, Austin TX. Photo by: Dr. Holly Hunts, Department of Health and Human Development, co-organizer of the week of events.

29th Bug Buffet hosts 825 people, ten workshops in 3 colleges
By Florence Dunkel

Making news this year at the 29th annual Bug Buffet was the geographic diversity of corporate sponsors: Chapul Bars, Salt Lake City UT; Merci Mercado, Mexico; Chloe's treats, Stamford CT; Bugeater Foods, Lincoln, NB; Aketta, Austin TX; Little Herds, Inc. Austin TX; Cowboy Crickets, Belgrade, MT; Ace Hardware, Bozeman MT.

Potato larva latkes (crickets substituted) made fresh with sour cream and a twist of lemon was one of 7 entrees at the 29th Bug Buffet.

Of these, most notable was the newly launched first Montana food insect farm, Cowboy Crickets, Inc. in Belgrade MT, a direct result of the 2016 Bug Buffet workshop in the class, Food Fundamentals. Owners of this vertical farm are a family, MSU students Kathy and James Rolin and their three children, Elise, Olive, and Liam. Also new this year was the involvement of social media organized by undergraduate students Teo Gould and Amber Roberts.

Thanks to our major MSU sponsors, we were able to bring in as the guest speaker for 10 workshops

as well as the Buffet, Robert Nathan Allen (RNA). Founder and CEO of Little Herds, Austin TX. RNA is a nationally known edible insect educator driven by his passion to address climate change and global food insecurity. Major sponsors of the week were: MSU Food Service; MSU College of Education, Health, and Human Development; MSU College of Agriculture and Montana Agricultural Experiment Station; and MSU Office of International Programs.

Bug Buffet 2017 marked the largest number of luncheon guests (825) and workshops hosting another 274 MSU students. Schools attending the buffet were the MSU preschool (CDC), Headwaters Academy, Amsterdam MT Public School 5th graders, Cottonwood Public School (K-8), and Bozeman High School Culinary Arts classes. Chief Joseph Middle School had an in-school workshop with RNA. From PSPP, Dr. Michelle Flennikin and her students, Laura Brutscher and Alex Mc Menamin, prepared a pollination booth for the Buffet, and Whitney Harchenko, graduate student of Dr. Jessica Rupp was the College of Agriculture representative to the Bug Buffet Committee. Originating as a class laboratory 29 years ago in BIOO 162CS Insects and Human Societies, this year students led by their teaching assistant, Claire Zahner, took major roles throughout the week in the MSU Food Service kitchen, in the workshops, and as guides for school groups sharing nutritional data and environmental footprint messages of this sustainable food appreciated by one-third of the world's population.

Co-organizer of the event with Dunkel was Dr. Holly Hunts, Associate Professor of Family Consumer Science, Department of Health and Human Development. A Big Bug thank you to all!

Truffle Hunting in Montana Canine Style
By Cathy Cripps

Truffles are famous in Europe for their unique flavor which can turn any meal into

Ilsa, Cathy Cripps, Chance Noffsinger, and Don Bachman hunting truffles

a gourmet feast. Currently Black Perigord truffles (*Tuber melanosporum*) run about $1,500 per pound and last year a perfect 4 lb. white truffle (*Tuber magnatum*) sold for $61,000. These sought-after fancy fungi grow underground and are sniffed out by pigs and dogs whose noses can detect their aroma through several inches of soil. The wild white Oregon truffle (*T. gibbosum*) is making a splash for its own distinctive flavor, lower price and availability; it is sold in PNW markets. Truffles are mutualistic (mycorrhizal) with trees making them difficult to cultivate. Truffle trees are sold with these fungi attached to their roots, but this has not panned out economically in the U.S. So when Chris Jacobson contacted me last fall to invite me on a 'truffle hunt', I was eager to see what her dog Ilse, a Belgian Malinois, might turn up in Montana. For years, I have been working in high elevation whitebark pine forests to determine which mycorrhizal fungi support this pine species that is under severe threat from blister rust and pine beetles. Some of the fungi fruit underground and although not 'true truffles' they are of interest ecologically and for inoculation of seedlings. I had been digging them up myself with clues left by squirrels. Could Ilse find these 'false truffles' for us? Chris, Ilse, my student Chance, husband Don and I headed up to one of our whitebark pine sites near Bozeman. Ilse, in her bright orange vest, scoured the ground methodically with her nose, and then started digging at the base of a tree in the dense forest. Her digging was delicate and precise, and a small orb rolled into the hole unscathed---it was a *Hydnotryum*, a

Hydnotrya cerebriformis, a false truffle

mycorrhizal ascomycete! We had not found this species here before, but Ilse's wonderful nose picked up its odor. Before long, Ilse had garnered about 5 different species for us. Although it was not a great season for fungi, she still managed to find the difficult buried ones. True, truffles do exist in the northwest part of Montana, but so far no luck here. Still, it was fascinating to watch Ilse work: She only went after the underground fungi, not the mushrooms above ground. The evolution of these fungi with mammals was evident. These underground fungi have developed strong odors that attract squirrels, voles, deer, bear and other mammals that dig them up, eat them, and disperse their spores from the other end of their digestive tracks!

St. Kitts and Nevis Beetle Survey
by Mike Ivie

Our team arrived on St. Kitts and Nevis on Monday, and the trip started off with a bang. From Montana State University, we are Michael Ivie, Lisa Seelye, Erich Spiessberger, Cayley Faurot-Daniels and LaDonna Ivie, and our job is to document the beetles of St. Kitts and Nevis for a UNDP Funded Project on "Conserving Biodiversity and Reducing Habitat Degradation in Protected Areas and their Areas of Influence, St. Kitts And Nevis" awarded to Environmental Awareness Group Inc. (Antigua).

We joined a large group already on-island led by Kevel Linsey from Natural Resources Management Initiatives in Brooklyn. The beetles of St. Kitts and Nevis are very poorly known, as are most of those of the Northern Leeward Islands with the exception of Montserrat. By "known" I mean have a listing in the scientific literature, although obviously many more are known to local people. Each island should have several hundred species actually occurring there, but the number of records for most are in the area of a few dozen. A list published by Peck in 2016 had only 134 species on St. Kitts and a mere 66 on Nevis. A majority of those are either widespread species or species introduced and associated with humans. Montserrat, on the other hand, where we ran a significant inventory effort, has over 700 species known, in spite of being smaller, lower and with 2/3 of her area devastated by the Volcano.

Therefore, it was no surprise that when we arrived, there were many beetles remaining to be discovered in the forests and mountains, or even that one of them would prove to be amazingly beautiful or unique. But, what we found waiting for us in the freezer at the group house was not some tiny, blind obscure thing from the top of Mount Liamuiga. No, it is a relatively large, beautiful, metallic lime green animal found in Independence Square in the very center of the capitol of Basseterre! This discovery is a perfect example of using the type of linkages we are building with this project.

A large, beautiful, metallic lime green animal found in Independence Square in the very center of the capitol of Basseterre!

MSU Crop and Pest Management School 2017
By Kevin Wanner

I would like to thank everyone who helped make the 2017 Crop and Pest Management School a success! The 2.5 day workshop was held on campus January 3-5 with 55 students attending from various areas of the state. We held the workshop in the EPS building where lecture hall 103 is equipped for remote presentations. A registration fee of $195 provides workshop supplies, morning and afternoon refreshments, parking and the traditional pizza dinner at Colombo's. Crop consulting (CCA), private pesticide applicator and commercial/government pesticide applicator credits were available.

Luther Talbert presenting a talk entitled, "Spring Wheat Varieties and Insect Resistance".

Collin Watters, Bureau Chief of the Montana Wheat and Barley Committee presenting a talk on entitled, "Industry Overview".

Special thanks go out to our guest speakers: Dr. Juliet Marshall, University of Idaho - "Cereal Cyst Nematode Management in Cereals", Scott Meers, Alberta Agriculture Ministry - "Managing Wheat Insect Pests in Alberta", and Collin Watters, Bureau Chief of the Montana Wheat and Barley Committee - "Industry Overview". In addition, 17 MSU staff from four departments covered topics in weed, disease, insect and nutrient management as well as wheat breeding.

Montana Ag Live Spring Schedule

March 26 - Kelsey Jensco, University of Montana Climatologist, "How has climate change affected Montana agriculture".

April 2 - Steve VanTassel, Montana Department of Agriculture Vertebrate Pest Specialist, "Do you love those little pasture rodents? If you don't, tune in to see what you can do to minimize their damage".

April 9 - Kevin McPhee, Montana State University's new pulse crop breeder, "Variety development for pease and lentils, the new 'big kid' in the norther great plains agriculture".

April 23 - Chris Kelly, Montana Department of Agriculture hydrologist, "Montana's ground water monitor program - keeping one of Montana's treasures sparkling".

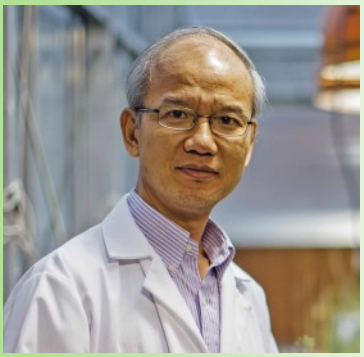
May 7 - Bob Quinn, Organic producer from Big Sandy, "Organic production in Montana - transitioning from traditional to organic production".

May 14 - Jeff Littlefield, Biological control specialist at Montana State University, "The success of biological weed control efforts in Montana and how Montanans can utilize this technology to help with their weed control efforts".

May 21 - Myles Watt, retired Montana State University economist, "The effect of public debt on Montana's economy including the agricultural sector".

The remainder of the spring schedule will be in the April newsletter.

Course Focus
BIOO 433—Plant Physiology - Chaofu Lu



This class is offered every spring semester. It is designed for upper level undergraduates (junior and senior) and graduate students, who have a basic knowledge of chemistry/biochemistry and living systems. Most of the students who take the class come from plant science related majors such as horticulture, plant biology, and crop science although many are from range science, wildlife management and others.

The scope of plant physiology as a science is very broad, ranging from biophysics and molecular genetics to plant development and environmental physiology.

Photosynthetic metabolism not only provides carbon and energy for the growing plant, but also determines the capacity of the plant to withstand environmental stress. The growth of roots, stems, leaves, flowers and seeds are regulated by a host of interacting factors such as hormones, light, temperature, nutrition and carbon metabolism. Plant physiology is a very active field of study and new revelations about how plants work are being published almost daily in predominant scientific journals such as Annual Review of Plant Biology, Plant Cell, The Plant Journal, and Plant Physiology among others.

In this class, we'll approach this subject from the perspective of the life of a typical angiosperm - from seed germination and plant development to how plants do things in their everyday life to flowering and plant death. Along the way, we will address topics of current relevance, such as the effects of increasing atmospheric CO_2 on plants, the use of plant materials for biofuels and renewable chemical feedstocks. The ultimate goal of this class is to uncover the inner workings of plants which we all depend on for our existence.

Invited Lectures

Phil Bruckner, 64th National Hard Spring Wheat Show, "Winter Wheat Production in the Northern Great Plains", February 9, 2017.

Cindy Morris, affiliate professor in our department and collaborator of Dave Sands, was an invited speaker at the annual meeting of the American Meteorological Society (https://annual.ametsoc.org/2017/) in a symposium organized in conjunction with the Phytobiomes Initiative (26 Jan, Seattle). Her talk, based on collaborative research with Dave Sands entitled, "The Challenge of Unraveling Feedbacks between Phytobiomes and Weather" was based on their publication about mapping rainfall feedback recently published in the Bulletin of the American Meteorological Society (http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-15-00293.1).

While in Seattle, Cindy had the opportunity to publish another of her works about the interaction of biology and cloud physics. She recorded her song *Clouds: When Physics meets Biology* with the help of a family member who is a professional musician. Details about how the song was recorded, the lyrics and a link to the recording are on the blog that she writes about biological ice nucleators: https://bioice.wordpress.com/2017/02/01/when-physics-meets-biology-there-is-poetry-and-music/

After this experience Cindy came back to Bozeman at the end of January to continue working with Dave Sands to set up trials to assess the variation among wheat varieties in their ability to generate bacterial ice nuclei for the atmosphere.

Grants

Shannon Arnold, Mac Burgess, Dustin Perry, "A Generational Approach to Outreach Education for Montana Youth, Young Adults, Educators, and Urban Specialty Crop Growers on FSA Programs". Farm Service Agency.

This project will aim to increase outreach, education and awareness of FSA programs, functions, and activities to Montana youth, young adults, educators, and urban specialty crop growers, distributors, and producers. The project team will assist FSA in reaching its goals by promoting financial safety, stewardship of the environment, and best production practices for current and future specialty crop growers, distributors, and producers. A series of outreach and educational workshops will be developed for each audience within the overall program to familiarize each generation with FSA loans that can support agricultural, financial, and production activities integral to enterprises. These workshops will be presented at 4-H and FFA meetings, MSU farm field days, MSU classrooms and farms, extension offices, farmers' markets, and professional conferences. A unique, modern communication approach will include the development of a professional promotional video for FSA. Project leaders, Dr. Shannon Arnold, Dr. Mac Burgess, and Dr. Dustin Perry, will aim to provide the technical, educational, and financial expertise to build awareness and knowledge of FSA within each of these areas.

Kevin Wanner, Emily Glunk, and Michael Schuldt, USDA National Institute of Food and Agriculture, "Increasing the Adoption of Alfalfa Weevil Integrated Pest Management in the Western Region".

Alfalfa weevil is the primary economic pest of forage alfalfa, a crop grown on 1.7 million acres in Montana and 17.8 million acres nationally. The objectives of this project are to quantify the current status of alfalfa weevil management in Montana and its impediments, conduct a pilot evaluation of area wide, real-time monitoring of alfalfa weevil populations and evaluate the accuracy of the degree-day model to predict alfalfa weevil development across different regions of Montana.

Not All Wood Borers Are Created Equal
by Laurie Kerzicnik, Associate Extension Specialist

When we have weakened or dying trees, we often blame beetles for coming in and doing the rest of the damage. But sometimes it could be other pest insects like moths. Cottonwoods, elms, ash, and other hardwoods can be infested with pest moths called carpenterworms.

Damage from carpenterworms can consist of misshapen trees, breakage of limbs during high winds, and dozens of exit holes in the trunks and larger branches. The caterpillars live inside the trees, boring into the sapwood and heartwood. The mature caterpillars can be quite large, reaching about 3" long.

Trees that are infested are likely already dead or dying, and management is not usually an option at this point. The photos are from a sample that came from a very old cottonwood tree in a shelterbelt in the Gallatin Valley. It was already dead and removed from the property.

Recipe of the Month

Irish Cream Chocolate Cheesecake

1 1/2 cups Oreo cookie crumbs
1/3 cup confectioners' sugar
1/3 cup unsweetened cocoa powder
1/4 cup butter
3 (8 ounce) packages cream cheese, softened
1 1/4 cups white sugar

1/4 cup unsweetened cocoa powder
3 tablespoons all-purpose flour
3 eggs
1/2 cup sour cream
1/3 cup Irish cream liqueur

Preheat oven to 350 degrees. In a large bowl, mix together the cookie crumbs, confectioners' sugar and 1/3 cup cocoa. Add melted butter and stir until well mixed. Pat into the bottom of a 9 inch springform pan. Bake in preheated oven for 10 minutes; set aside. Increase oven temperature to 450 degrees.

In a large bowl, combine cream cheese, white sugar, 1/4 cup cocoa and flour. Beat at medium speed until well blended and smooth. Add eggs one at a time, mixing well after each addition. Blend in the sour cream and Irish cream liqueur; mixing on low speed. Pour filling over baked crust.

Bake at 450 degrees for 10 minutes. Reduce oven temperature to 250 degrees, and continue baking for 60 minutes.

With a knife, loosen cake from rim of pan. Let cool, then remove the rim of pan. Chill before serving. If your cake cracks, a helpful tip is to dampen a spatula and smooth the top, then sprinkle with some chocolate wafer crumbs.

March Birthdays

Bernard Nyamesorto	2
Justin Vetch	5
Eva Grimme	9
Andrea Varella	11
Uta Stuhr	21
Erin Troth	24
Elaine Nichols	31