

Plant Science Says



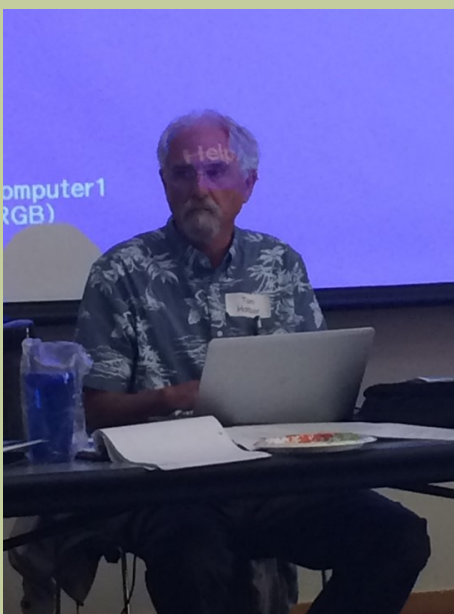
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September, 2014

WERA-1017 Meeting

By Mary Burrows

It was a busy July in the PSPP Department. July 7-8 Laurie Kerzicnik and Mary Burrows hosted the WERA-1017 meeting in Bozeman. I know I know; you all know that WERA-1017 is a western region working group for Integrated Pest Management State Coordinators! But what does a group officially titled the



Tom Holtzer, CSU. Don't we all feel like this during long meetings?

'Coordination of Integrated Pest Management Research and Extension/Educational Programs for the Western States and Pacific Basin Territories' really do? Well, we mostly discuss IPM education in our states, inspire each other, and take a tour of IPM in the host state. We had representatives from every western state (except one), Alaska, Hawaii, and Guam. The Hawaii (Arnold Hara) and Guam

(Robert Schlub) representatives were just happy it didn't snow this year. We had reports from Tom Holtzer, WERA-1017 Administrative Representative, Jim Farrar, WRIPMC Director, Marty Draper, USDA National Program Leader for IPM, Bob Nowierksi, USDA-NIFA, and Virgil Dupuis, Salish Kootenai College. On the second day we

had a great tour of Yellowstone including a tour of the Heritage Research Center (including the rare book collection), Roy Renkin (the IPM coordinator for YNP), and joined Bruce Maxwell's class for a look at invasive species in YNP.

2014 Weevil Workshop

By Laurie Kerzicnik

I attended a weevil identification workshop in the Chiricahua Mountains in Portal, Arizona from August 5-13. The number of described beetle species is about 400,000, and weevils represent about 16% of these. They are diverse, abundant, and a difficult group to identify. Seventeen people were at the workshop with instructors from Arizona State University, University of Florida, and Ottawa. We spent our evenings sampling insects with blacklights, mercury vapor lights, and sweep nets. I also managed to capture some new arthropod friends for my office!



Portal Research Station

APS-CPS Joint Meeting - Two Perspectives

David May

I attended the APS-CPS joint meeting in Minneapolis, Minnesota from August 9-13. Fellow graduate students Nar Ranabhat and Carmen Pol, along with Drs. Barry



Guess which book was Mary's favorite in the rare book collection.

Jacobsen, Mary Burrows, Zach Miller and Alan Dyer, were also in attendance. The theme of this year's meeting was "Plant Health Connections". Thousands of plant pathologists from around the world were there to present their research, discuss new technologies, and address the food security challenges facing agriculture and society today.

I gave a talk during the technical sessions about my work in breeding nematode-resistant wheat varieties for Montana growers. The presentation was well-received and generated some excellent questions from some of the plant pathologists that attended. There were many excellent presentations given, on topics ranging anywhere from international agriculture and rural development, to population biology and genetics, to fungicide resistance. Plant nematology was an especially hot topic this year and a talk given by a Monsanto breeder on his struggles in developing effective nematode-resistant cultivars was particularly enlightening. Alan mentioned a talk given on the emergence of ramularia leaf spot in barley fields in Argentina as a topic that may very well be of future concern for Montana barley production.

One of the best things I did this year was to really up the level of my involvement in the Society and become more engaged in the different committees I am a part of. I began organizing a plant breeding symposium with members of the graduate student committee for one of the upcoming meetings. Even though I am not a plant pathologist strictly speaking, it was great to meet and befriend fellow graduate students, some of whom I will be working alongside in the future. I truly value my membership in APS and intend to stay involved for the duration of my career.

Nar Ranabhat

I attended the American Phytopathological Society (APS) and Canadian Phytopathological Society (CPS) joint meeting from August 9-13 in Minneapolis, Minnesota. The unexpected cool weather in Minneapolis was enjoyed by all the attendees. The convention had a series of sessions featuring talks, posters, and committee meetings.

After several workshop and committee meetings, the convention had an official welcoming meeting that was streamed live. We were able to join the APS opening session

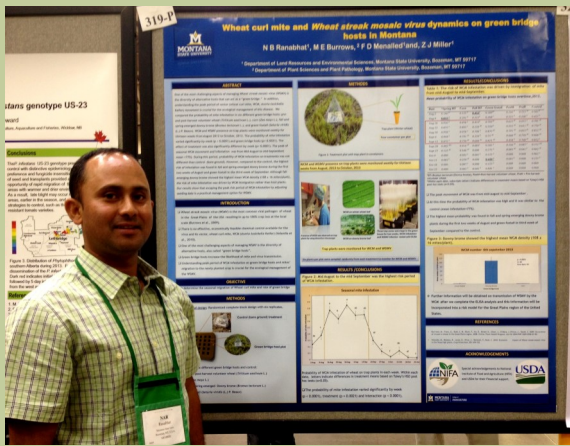


Attendees of Wheat-Virus-Mite project meeting, Hilton, Minneapolis, MN

and Awards and Honors ceremony connecting all APS members around the world. Plenary sessions included nice talks about plant health connections, connecting the phytobiomes, GM crops for Africa and your best frenemy: science, the media and making your point. There were more than 300 talks about all aspects of plant pathology during technical and special sessions.

For me, it was an invaluable opportunity to attend my first APS meeting and meet several professional plant pathologists. I took part in a field trip workshop entitled "Crop protection-from seed to harvest". The trip started with a visit to the Sugar Beet Breeding Research Center of The University of Minnesota coordinated by extension plant pathologist Dr. Mohamed Khan, the University of North Dakota, and the University of Minnesota. Next, Syngenta organized lunch and gave several talks about its research and agricultural products. Finally, the trip ended with a visit to one of the most successful historical vineyards.

There were more than 600 poster presentations with poster huddle time and idea cafés discussing a specific field of research. I presented a poster regarding my work on wheat streak mosaic virus (WSMV) dynamics. It was a pleasure talking with pathologists from all over the world and different stakeholders from the wheat-mite-virus project. The project runs the same research in six Great Plains states and we represented Montana. We had a meeting with all the PIs and researchers working on the project about the progress and future goals of the project.



Nar Ranabhat with his poster "Wheat curl mite and Wheat Streak Mosaic virus dynamics on green bridge host in Montana"

Overall the meeting was a wonderful opportunity to meet people from various agribusiness companies. It was also a nice long way to drive with beautiful landscapes in Montana, North Dakota and Minnesota.

**4th Annual National Association of Plant Breeder's Meeting
By Afaf M. Nasseer**

Recently, I attended the 4th Annual National Association of Plant Breeders Meeting in Minneapolis, Minnesota. The theme of the meeting was "Breeding for Water Stress". Also in attendance were Jamie Sherman, David May and Duke Pauli.

In the evening, I got chance to visit parks and the University of Minnesota. I also had the opportunity to taste a variety of foods and beers. Zach and David suggested I taste a different beer every night as I am quite an amateur in this field. Additionally, I met more than 25 Nepalese plant pathologists working in different states. We organized a Nepali night at a Nepali Restaurant that opened just for us as it is ordinarily closed on that day. David joined us and got chance to taste different Nepali food for the first time in his life.



Afaf Nasseer and Jamie Sherman at the National Association of Plant Breeders Meeting



Nar Ranabhat and David May with all of the attendees that were originally from Nepal.

I was eager to attend the presentations and get to know people from other universities. My poster was selected to be in a competition, which included a one minute oral presentation. The title of my poster was "A Tilling Gene Affects Phenotypic Plasticity in Spring Wheat". Thursday was the busiest, as we started our day around 6:30 a.m. and rode the bus to visit Syngenta's fields and labs. We spoke with many of the scientists who work for Syngenta and they shared their experiences. We returned to the Marriott Hotel at 1:00 p.m., where the conference was held, and attended talks until 3:00pm. We presented our posters from 3-4:30 pm and exchanged information with judges, researchers, and graduate students. From 4:30-8:45 p.m., there were more talks.

After attending many talks and presentations, I came away with some very useful information regarding the use of molecular tools to improve drought tolerance in a variety crops, vegetables, and fruits.



Sculpture Park in Minneapolis, Minnesota



David May and Afaf Nasseer with Afaf's poster, "A tillering Gene Affect Phenotypic Plasticity in Spring Wheat"

"Coordinated conservation and farm and ranch programs can be beneficial to both the environment and production agriculture"

October 19

Jess Aber, DNRC water resource staff scientist and member of the Governors Drought Advisory Panel, "Water usage in Montana and the factors that influence long and short term availability"

October 26

Steve Jenkins, Engineer, Western Transportation Institute, "Road issues in rural Montana cities and counties"

Course Focus

Matt Lavin - Evolution - BIOB 420



Montana harbors two kinds of ponderosa pine, the west- and east-slope forms. West-slope ponderosa pine, *Pinus ponderosa* subspecies *ponderosa*, is the important timber tree that occurs west of the continental divide (Figure 1). East-slope

ponderosa pine, *Pinus ponderosa* subspecies *scopulorum*, often has a shrubby appearance and is well known from the Missouri breaks east of the divide. Knowing something about the evolutionary adaptations of these two forms of ponderosa pine, as well as the history behind how they both arrived in Montana, may be important for managing these two forms, one mostly for timber and the other mostly for wildlife habitat.

The Evolution course, BIOB 420, uses case studies like that of Montana's ponderosa pine to address the two principal areas of evolutionary biology: 1) adaptation via natural selection and 2) history. For each of these two areas of evolutionary biology, case studies are presented during the evolution course, along with data in simplified form, which is analyzed by the students so that they can reinforce their understanding of how adaptation and history are studied by evolutionary biologists.

West-slope ponderosa pine reproduces best in a wetter climate and on deeper soils compared to east-slope ponderosa, which reproduces best in the drier climates and more clayey soils east of the divide in Montana. This suggests these forms of ponderosa pine are each optimally fit to their respective environments, a fit that is

On Saturday, I took a 90 minute trip down the Mississippi on a public boat. At the beginning I was fearful, as this was my first time on a boat trip on a big river without friends or family. I also walked downtown and went to the biggest mall in the United States, The Mall of America. It was a very worthwhile trip in every way.

Montana Ag Live Schedule for Fall, 2014

September 14

Dean Williamson, Founder of Three Hearts Farms, "Market Garden Innovation"

September 21

Barry Jacobsen, Director of MSU's Research Centers, "MSU's Statewide Research Center System"

September 28

Emily Glunk, Assistant Professor in the Department of Animal and Range Sciences, "The key to beef production in Montana"

October 5

Clain Jones, MSU Extension Soil Fertility Specialist, "Fall fertilization programs in both farm and urban settings"

October 12

Robert Sanders, Ducks Unlimited Manager of Conservation Programs for Montana and Kent Wesson, Phillips County Farmer and Rancher,

explained by adaptation via natural selection. Adaptive traits are those that confer fitness, or an optimal rate of lifetime or family reproduction. During the evolution course, adaptive traits, such as the ability to respond to and grow vigorously during the short growing season east of the continental divide in Montana, can be studied by analyzing populations of individuals that vary in suspected adaptive traits. North of Helena in the vicinity of the town of Wolf Creek and the Holter Dam area, west-slope ponderosa has migrated into the habitat of east-slope ponderosa pine such that populations of hybrids and both parental species co-occur. Genetic and other evidence suggests that large-scale eastward migration of west-slope ponderosa is very limited and that east-slope ponderosa predominates east of the divide even right up to the very edge of the continental divide. East-slope ponderosa shows evidence of being best adapted to the drier conditions east of the divide. West-slope ponderosa, the evidence suggests, is not as fit in an east-slope environment.



Figure 1. West-slope ponderosa (left – photo taken in Polson, Montana) is a tall-statured tree with a straight trunk that loses the lower lateral branches as the tree matures. The needle-leaves come in fascicles of usually three or more needles and the length of the needle-leaves is much longer than the length of the pinecone. East-slope ponderosa (right – photo taken south of Malta, Montana) is shorter-statured and with trunks that bear many lateral branches low on the tree even at maturity. The needle-leaves come in fascicles of usually two but sometimes three and the length of the needle-leaves is just a bit longer than the length of the pinecone.

Evolutionary history is studied most commonly with fossil and genetic evidence. During the evolution, course, however, genetic evidence is primarily analyzed for historical information. The fossil evidence for ponderosa pines, as is typical for most species, is scanty to non-existent. Packrat middens, for example, contain ponderosa pine needles and cone scales that can only suggest that this pine has been in residence in southwestern U.S.A. and adjacent Mexico for thousands of years. Genetic evidence, in contrast, suggests that the ponderosa pine has been in residence in the arid regions of south western North America for perhaps a million years. This reasoning comes from the theory that populations that persist in large sizes will accumulate genetic diversity as a function of time. Furthermore, genetic evidence reveals that during something like the post-glacial period, the ponderosa has migrated northward in two separate events. This reasoning is derived from the finding of less genetic diversity in northern compared to southern populations of ponderosa pine, and that the two separate northern migrations were not expected to sample the same ancestral genetic variation as they migrated north (an expectation of the theory of genetic drift). One northern migration event occurred along the Sierra-Cascade cordillera and eventually ended up in northwestern Montana. The other northern migration event occurred along the Rocky Mountain front and eventually populated eastern Montana. Each of these northern migrations carried different genetic and phenotypic signatures. See (Fig. 1).

During the evolution course, the effects of migration on the genetic variation of populations and individuals, whether recent immigration into a new area or among populations that have been evolutionary persistent in the same region, is studied and data sets are analyzed. In the case of the ponderosa pine in Montana, data sets are analyzed to reveal how gene flow via pollen rather than seeds is responsible for some of the eastward migration of west-slope ponderosa across the continental divide near Wolf Creek. From a management perspective, the limited hybridization between these two evolutionarily distinct forms is not introducing genes from one form into populations of the other form. This is especially the case for east-slope ponderosa, which shows little if any sign of migrating west across the divide. Little concern is thus warranted from the perspective of timber management.

I chose to discuss the evolutionary perspective of Montana's ponderosa pines because it makes a good local example of a study that can be detailed and analyzed in a couple of lecture classes. Using many such case studies over the course of a semester is very effective for introducing the evolutionary concepts of adaptation and history, and detailing the evolutionary processes that shape evolving lineages, including mutation, migration, genetic drift, and natural selection.

One aspect that is not covered in this evolution course is the debate over creation science and intelligent design. This is for the same reason that a flat-earth theory is not taught in a geology course, alchemy not taught in a chemistry course, or astrology and geocentrism not taught in a physics course. Science does not cater to a particular people, place, and time, so legitimate scientific theories do not come in a Christian, Islamic, masculine, Native American, or any particular form. They come in only the form that is open to scrutiny and testing by potentially anyone.

The evolution course has been team-taught for many years. I have always instructed the history part of the course and Kevin O'Neill (from Land Resources and Environmental Sciences) has taught the part focusing on natural selection. Beginning Spring Semester 2015, a new Plant Sciences geneticist, Ryan Thum, will replace Kevin O'Neill in teaching all of the issues related to the process of adaptation via natural selection.

New Graduate Students

Elisa Boyd - Michelle Flenniken, Advisor



This fall, Elisa Boyd will be *evaluating generational resistance to PVY in potato* with Michelle Flenniken and Nina Zidack for her masters program. Originally from Boulder, Colorado, Elisa has lived in Bozeman since the start of her undergraduate degree in 2009. She completed her degree in

Environmental Horticulture with an option in Landscape Design in 2013 and never left MSU. During her undergrad and the year after, she worked for David Baumbauer at the Plant Growth Center and Horticulture Farm. Since graduation she has had the opportunity to travel. At the end of summer 2013 she visited Montreal, Canada for a landscape design class, and in the fall traveled to the Dominican Republic to intern at Orchids Dominicana. During the spring semester of 2014 she worked in Mike Giroux's lab and developed an interest in the molecular aspect of plant science, which eventually lead to her upcoming project.

When she isn't studying, Elisa enjoys hiking, skiing, and horseback riding. Second to studying, most of her time is spent at the barn working with Hugo, a young off the track Thoroughbred. They hope to show this

fall and eventually event, where horse and rider complete a phase in dressage, cross-country, and show jumping.

Elisa is excited to continue her education at MSU after a year off from school and to continue living in beautiful Bozeman.

Danielle Grimm - Ryan Thum, Advisor



Danielle Grimm is a new Master's student in the Thum lab. She arrived in Bozeman in late August, and is looking forward to using the greenhouses to study the evolution of invasiveness in the invasive aquatic plant species *Myriophyllum spicatum*, commonly

referred to as watermilfoil.

Danielle moved to Bozeman from Muskegon, MI where she has been studying the role of hybridization and sexual reproduction in the growth and spread of watermilfoil. This plant is capable of hybridizing with a native plant species, and hybrids commonly display increased invasive characteristics such as growth rate and muted response to herbicides. Danielle received her undergraduate degree in Cell and Molecular Biology at Grand Valley State University in 2013, and worked as a research assistant during her time there.

In her free time, Danielle enjoys reading, cooking new foods, and biking. She is looking forward to enjoying the abundant outdoor activities available in Montana. Danielle says, "I am very excited to be in the beautiful state of Montana for the first time, and am looking forward to a challenging and rewarding experience in graduate school."

Eylul Kaya - David Sands/Mike Giroux, Advisors



I am a new Plant Pathology Master's student and I'm currently working with David Sands. I am from Turkey and came to Bozeman four years ago to complete my Bioengineering degree. My interest in this area has arisen with help from Dr. Sands, whom I met

when I took his course, Introduction to Biotechnology. The topics covered in the course sparked my interest.

Biological Sciences have been my passion since high school. I always enjoy reading science news and watching biology and related documentaries. My interest in biology led me to bioengineering. I had internships in a genetic diseases diagnosis center and a tactile research laboratory.

In the Plant Pathology lab, I have worked on biocontrol of Water Hyacinths, biocontrol of Striga, the seed-strip project, a bioassay to detect soil deficiencies, amino acid inhibition of pseudomonas and plasmid curing agents derived from a virus resistant barley.

I'm mostly an indoors person but when I have a chance I like wandering around in art galleries or going to a concert. Also, I love watching documentaries about astrophysics, quantum mechanics and the lives of great scientists. Nikola Tesla is by far my favorite scientist (thank you Wi-Fi).

Martha (Marlee) Jenkins - Cathy Cripps, Advisor



My name is Martha Jenkins and I am a new graduate student in the Plant Sciences & Plant Pathology department. This fall I will begin to work toward a Master's of Science in Plant Science in the lab of Dr. Cathy Cripps. My work will include research and experimentation on the

recovery and conservation on the white bark pine through mycorrhizal associations and other environmental factors.

I attended the University of Tennessee at Chattanooga, where I played Division I soccer for four years, and graduated in December of 2010 with a BS in Environmental Science. In 2011 I moved to Salmon, ID to work as an invasive weed management intern in the Salmon-Challis National Forest. My appreciation for the Rocky Mountains grew with this internship and I was excited to move to Bozeman in January of 2013. For the past year and a half I have had the privilege of working for Bridger Brewing. In the summer of 2013, I also enjoyed working as a rangeland ecology field assistant with the Montana Natural Heritage Program.

After a full summer of adventures to Zion National Park, Bryce Canyon, Glacier National Park, Yellowstone, the Tetons, time with family in Tennessee, and climbing in Wyoming I am ready to buckle down and commit to this wonderful opportunity to work with Dr. Cripps and the white bark pine project.

Charlemagne Lim - Prachant Jha, Advisor



Hello! My name is Charlemagne Alexander A. Lim, a Filipino and a new graduate student at the PSPP department. I arrived in Montana on May 19th, and immediately embarked on

research work at the Southern Agricultural Research Center in Huntley.

I finished my Bachelor's degree in Agriculture at the University of the Philippines Los Baños and also finished my Master's degree in Agronomy at the same aforementioned university. After finishing my bachelor's degree, I worked for three years as a university research assistant at the Institute of Plant Breeding, an institution that breeds/develops new and improved varieties of different crops starting from cereals and vegetables to fruit trees and ornamental plants for the benefit of our country's growers. Also, for a short period of time, I worked at the International Rice Research Institute, a non-profit institution whose main thrust is improving rice quality and yield to alleviate hunger in rice producing countries.

Although its a bit hard to be away from home and family, I keep myself busy through work, reading, listening to music and getting to know new people. I am used to hot and humid weather, so the coming winter is going to be a challenge for me but nevertheless, it will be an exciting experience. The vast green plains and big mountains of Montana together with the wildlife is an awesome sight. I am excited to see the MSU campus and to mingle with the inhabitants of the Bozeman community. Being a graduate student is going to be a tough challenge but also fulfilling. So, I am excited and motivated!

Mehmet Ozseyhan - Chaofu Lu, Advisor
Merhaba (Hi)



I am a new Master's student in the Lu Lab. I arrived in Bozeman the first week of August. I will work on the lipid metabolism to increase hydroxy fatty acid content of *Camelina sativa*.

I was born and bred in the Bursa Province of Turkey where delicious chestnuts and peaches are grown. I am a single child like my father so that I, most of the time, find my own path in every situation without getting help from siblings. This courage gives me the ability to succeed. Since my father works in the private sector, we periodically moved to a new house every 4-5 years. The house that we are living in now is our 6th house and probably my family will move again within this year. In essence, I have a special ability to make new friends and adjust to a new environment.

I spent my freshman and junior years at Istanbul Tech University and my sophomore and senior years at Montana State University as a Bioengineering major in the Chemical & Biological Engineering Department. After I took a plant biotechnology course and lab from Dr. Mike Giroux in my last semester, I felt a strong passion for plant science because I am able to apply the theoretical knowledge that I learned in the classroom into something that I can observe and evaluate.

I am a member of generation Y, therefore my electronic devices are irreplaceable elements of my life. Believe it or not the internet is a staple in my life and I cannot imagine a life where continuous learning does not take place. Besides my technophile character, I enjoy hiking, road tripping, and playing table tennis and soccer. I generally listen to singers such as Dean Martin, Al Martino, and Frank Sinatra. Oldies are goldies everytime. Moreover, I would like to recommend some Turkish singers like Tarkan, Candan Erceetin, and Ajda Pekkan. By the way, I share my favorite playlists in my blogger address. Just google my name.

All in all, you are able to see my happiness and enthusiasm in my eyes; I am glad to be here in Bozeman and ready for the problems awaiting solutions as a Master's student.

Jeff Pachnick - Ryan Thum, Advisor



I'm Jeff Pashnick, a new Ph.D. student in Dr. Ryan Thum's lab, an equally new faculty member. Until just recently, I lived in Michigan where I attended Grand Valley State University where I received my bachelor's degree in

Biology and master's degree in Cell and Molecular Biology. In stark contrast to my Plant Genetics program here at MSU, my master's thesis focused on ancient human population genetics.

While my master's degree subject was far removed from plants, I spent the last few years in Michigan also working under Dr. Thum doing genetic identifications on native, invasive, and hybrid watermilfoil plant species. I'm excited to begin research here at MSU, and dive deeper into the genes behind invasive species. Immediately after arriving in Bozeman, I flew out to Monterey, California for an invasion genetics conference as a way to kick start my project here at MSU. Learning the newest analyses and techniques high impact scientists are using in the study of invasion genetics was interesting and I saw how they could be applied to my project during its initial design. The change in scenery from Michigan to Montana, and the change in science from humans to plants are both invigorating, and in short, as Ryan put so eloquently, I'm stoked.

The Hobo Spider Laurie Kerzicnik

It is hobo spider season, and it's time to get the right facts out there. The hobo spider, *Eratigena agrestis*, is a funnel web spider that was introduced from Europe into the Pacific Northwest in the early 1900's. It has since spread east to Montana and south to Utah. In Europe, it was not aggressive and was of no medical importance to humans. However, a scientifically unsound paper was published in 1991 by Akre and Myhre that indicated that the hobo spider produces necrotic lesions in rabbits, and this is the only paper that has reported such a claim. This created a mass hysteria associated with the spider. However, this paper and research has since been discredited. It is now clear that the hobo spider is not dangerous and is not of medical importance.



Male hobo spider

The hobo spider also does not have the compound that the brown recluse has (sphingomyelinase D) that causes necrotic lesions. The mass hysteria still runs rampant over the internet, in books, and in the media, and I hope to change that with education and outreach this fall (unless the anti-spider Mafia puts a hit on me).

Ripening Tomatoes By Toby Day Extension Horticulturist

Bringing in tomatoes in pots or covering tomatoes that are planted outside won't make much a difference as the temperatures will soon dip way below freezing. However, there are still a couple of ways to ripen your tomatoes.

The greenest of tomatoes on the vine may never have a chance to ripen, but if they have even partially turned from green to even yellow-green, the ripening process has started and can continue with a couple of tricks.

My favorite (but messy) way is to bring the tomatoes indoors and hang them upside down in a dark, cool room (many times the garage works well). Slowly, the tomatoes will ripen. They aren't as good as the ones you picked off the plant before the frost, but still better than many of the ones that you'll find in the grocery store.

You can also pick the remaining tomatoes and wrap each one in newsprint, put them in a box and store them in a cool place such as a downstairs room or in the garage. I don't like to take the time to wrap each one and unwrap each one to see if they are ripe. To make the process a little less cumbersome, you can put some newsprint in a box, put the unripe tomatoes in a single layer and then cover the tomatoes with newsprint. Then you can stack a few more tomatoes on top and cover those



Ripening tomatoes upside down (fortheloveoffood blogspot)



A box of ripening tomatoes

again with newsprint. I wouldn't stack them more than two rows high or they might get crushed. You can also do this with paper bags.

Another trick is to stack tomatoes with similar ripeness, the real green ones on the bottom, the ones starting to ripen stacked above and so on. That way, you are not digging through all the tomatoes to find the ones that are red. And, for those that can or freeze tomatoes and want them all to ripen at relatively the same time, put an old apple or some apple peelings in the box. The apple or peeling will release ethylene that will hasten the ripening process. Check them daily as they might ripen faster than you think.

Oh, and if you hang them upside down, put them close to the floor or check for ripening each day. I did this once and left for a week to find a bunch of ripe tomatoes that had fallen and hit the concrete floor, making a big tomato mess I had to clean up!

Masters Gardeners from around the State take Level 3 Class

By Toby Day

Extension Horticulturist

Thirty Master Gardeners from eight counties from around the state completed the Level 3 intensive training in Bozeman August 21-23. Level 3 Master Gardener is the highest level in Montana and the volunteers are handpicked by their agents to represent MSU Extension in their communities.

Master Gardeners had temperament training to learn how to work more effectively with volunteers, learned from each other about current IPM issues, toured the PGC and The Schutter Diagnostic Lab, had a great lecture from Mike Ivie, and a tour and learning session at the insect collection at Marsh Lab. They also toured the Farmer's Market, Hort Farm, a local market farm and a pick-your-own operation. The counties represented were Cascade, Chouteau, Flathead, Gallatin, Hill, Pondera, Sanders and Yellowstone. A big thank you to Dara Palmer, David Baumbauer, Eva Grimme, Laurie Kerzicnik, Hilary Parkinson, Mike Ivie and all of Mike's graduate students and helpers during the visit.



2014 Level 3 Master Gardener Graduates including PSCPP graduate student Hannah Estabrooks

Farewell to Mina Talajoor and Steve Hystad

Steve Hystad will begin employment with Simplot on September 8. His title will be Associate Molecular Scientist and he will be working with strawberry transgenics. Congratulations Steve and we wish you and your family all the best!

After over 5 years of working in Plant Sciences, Mina Talajoor is pursuing her dream of owning a custom letterpress and design boutique. Her shop, Birdwalk Press, will sell greeting cards and paper goods as well as offer custom pieces for special events. Birdwalk Press will be located downtown on 319 E. Mendenhall starting mid September. Stop by and say hello to Mina!

September Birthdays

Tracy Dougher	1
Laurie Kerzicnik	2
Irene Decker	5
Rosemary Keating	15
Vipan Kumar	17
Michelle Flenniken	18
Gary Strobel	23
Bill Dyer	26
Afaf Nasseer	26
Mark Young	27
David Baumbauer	27



Recipe of the Month

Beef Stew with Beer and Paprika

3 T Olive oil
1 T butter
2 lbs stew meat
1 whole medium onion, diced
3 cloves garlic, minced
1 can (12 oz) beer
4 c beef stock or 4 c water + 4 beef bouillon cubes
2 c water
1 T Worcestershire Sauce
2 T tomato paste
1/2 t paprika
1/2 t kosher salt
Freshly ground black pepper
1 1/2 t sugar
4 whole carrots, washed, unpeeled, and roughly sliced
4 whole new potatoes, quartered
Minced parsley



Heat oil and butter in a large pot over medium-high heat. Brown meat in two batches, setting aside on a plate when brown. Cut pieces in half.

Set aside.

Add diced onions to the pot. Stir and cook for two or three minutes until softened, then add garlic for another minute. Pour in beer and beef stock, then add Worcestershire, tomato paste, paprika, salt, pepper, and

sugar. Add beef back into the pot. Stir to combine. Cover and simmer for 1 1/2 to 2 hours.

Add carrots and potatoes, then cover and cook for an additional 30 minutes. (If stew gets dry, just add a cup of hot water at a time to replenish liquid. Taste and adjust seasonings as needed. Serve in bowls next to crusty French bread. Sprinkle with minced parsley if desired.

Photos from the Summer Contributed by Bill Grey



Dale Jorgensen, Dave Gettel, Post Farm Manager and Jeff Todd, Post Farm Foreman

Alanna Marries Guthrie

On Saturday, Alanna Schlosser married Guthrie Oiestad in Dupuyer, Montana at the beautiful Theodor Roosevelt Memorial Ranch. Witnessed by friends and family, the two exchanged vows atop a hill surrounded by the stunning Rocky Mountain Front. The two have spent many a day hiking and hunting in these mountains, so the location was especially meaningful. Congratulations Guthrie and Alanna!



Lentil harvest with Dave Gettel's combine that his family farm donated to MSU. They are harvesting Lentil 'Avondale' foundation seed for pure seed production.