

Plant Science Says



Happy Thanksgiving!

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The Department of Plant Sciences and Plant Pathology

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The North American Mycological Association Annual meeting and Foray By Cathy Cripps

The North American Mycological Association annual meeting and foray was held near Eatonville, Washington October 9-12. Over 300 people congregated at a small camp surrounded by the stunning forests of the Pacific Northwest near the Cascade Mountains and Mount Rainier National Park. Talks were scheduled in two concurrent sessions each day and these sessions conflicted with field trips, so it was difficult to decide which activity would be most mycologically interesting. My former graduate student, Kate Mohatt, now the ecologist for the Chugach-Tongass Forest in Alaska, decided we needed to see what fungal treasures might be found at the foot of Mount Rainier. The forests of fir, spruce, giant Douglas fir, Western white pine, and red cedar were dense and deep. Light barely penetrated to the forest floor, which was completely carpeted with mosses and lichens. Mushrooms were everywhere: on the ground, on wood, under giant logs, on moss. We collected the



Cathy Cripps and Kate Mohatt at Mt. Rainier

freshest specimens and brought them back to camp where each species was put in a display container. My duty as an 'Identifier' was to help determine the names of the mushrooms brought in by 300 people. We photographed, displayed, vouchered and identified well over 400 fungal species in two days! The specimens were displayed for the public, and then dried and shipped off to the Field Museum in Chicago as part of the Mycoflora of North America project.

Talks included those on Pacific Northwest Russulas, Polypores and Boletes. Dr. Tom Bruns from Berkeley covered 'Forest Fires and Fungi', Dr. Michael Beug gave insights into the 'Fungal



Field Camp



Polypore display



Display mushrooms

toxicology of Ascomycota', and Dr. Jim Trappe covered 'Interactions of truffles, animals, and trees'. Rytas Vilgalys from Duke University and I presented the whole Saturday afternoon session from 1:00 to 4:30 pm. Rytas did an overview of 'Environmental Genomics in the Forest Microbiome' and I presented on 'Ectomycorrhizal mushrooms in Arctic and Alpine habitats'. It was good to see Rytas again ---mycologist Dr. Orson Miller was mentor to both of us at Virginia Tech. The evening was capped by Paul Stamets' 2 hour talk on 'Powerful Polypores: Novel Discoveries'. Mycophagy sessions allowed Don and I to taste mushrooms cooked by experts. On Sunday, we mycologists did a 'walk around' and talked about the mushrooms on display to the participants. My contribution was a demonstration on 'Morphological Variation' complete with big piles of the same species in all its forms. I think it is the best way to learn a taxon. The next meeting and foray will be in North Carolina near the Blue Ridge Mountains.

Sustainable Foods Students, Associate Provost live and learn on Reservations By Florence Dunkel

Sustainable Foods and Bioenergy Systems (SFBS) students, along with students in Liberal Studies, French, Spanish, and Cell Biology, met with Elders and young Native American leaders earlier this semester. For all students, it was their first visit to a Native American Reservation. For this required part of the course, AGSC 465R Health, Poverty, Agriculture: Concepts and Action Research, students prepared culturally, reviewed previous students' research with these communities, and practiced the holistic process of community engagement for several weeks. The night before their departure to the Reservations, Native American Studies Assistant Professor Gail Small, an enrolled member of the Northern Cheyenne and co-instructor, Jason Baldes, an LRES graduate student and Eastern Shoshone leader of the reintroduction of free ranging buffalo met with students in the PBB to

sharpen holistic process skills focused on energy and water conflicts on Reservations.

On day 1, students traveled four hours by car to the capital of the sovereign nation of the Northern Cheyenne, Lame Deer, Montana. There, on the campus of Chief Dull Knife College (CDKC), students and their professor, Florence Dunkel, engaged in conversations with the Dean of Students (Zane Spang), staff (Kathy Beartusk, direct descendent of Chief Dull Knife himself), CDKC students, and the tribal leader for historical place preservation (Conrad Fisher). Students visited the Head Start Preschool and the drug and alcohol abuse center. Considered a food desert, the Northern Cheyenne Reservation has one grocery store. Quality and costs were an eye-opener for SFBS students as they reviewed the aisles of packaged foods and the fresh produce and meat sections.

The Franciscan Retreat Lodge on the Northern Cheyenne Reservation near Busby was our home on the reservation. Collaboratively prepared meals from locally grown, hunted, gathered foods was the prelude to an intense discussion of youth engagement, skills training, and cultural richness on the Rez.

On day 2, MSU Associate Provost for International Programs, Dr. David DiMaria and his wife from Karollina, Russia, joined us for the day and evening. On the shores of the lake in the middle of the city of Lame Deer, we presented a cheetah (grassroots leader) award to former MSU student, Meredith Tallbull. Meredith, one of our site mentors for the course, was recognized by



We have just presented Meredith Tallbull with a Pendleton blanket from Hopa Mountain, a Bozeman-based NGO that focuses on Native American leaders.



Assisted by Assistant Professor Gail Small and LRES graduate student Jason Baldes, AGSC 465R students analyze the community's approach to environmental water and energy issues on Northern Cheyenne and Wind River Reservations using the holistic process. From left: Alex Bostrom (Liberal Studies -Quaternary), Cassandra Lieffers (Sustainable Food), Sebastiaan Stohof de Jong (SustainableFood), Gail Small, and Jason Baldes.

On Day 3, students visited their predecessors' Apsaalooke project site in Lodge Grass, Montana, and met with Elders and learned about chokecherry pemmican preparation. This project is part of the "Let's pick Berries" that emerged from Elders of the tribe and has been one of the course projects for the past four semesters.

On Day 4, Dunkel attended the opening ceremony of the CDKC celebration of Native American week, took the faculty and student hike, and watched the teepee construction competition. Dunkel also conferred with President Richard Littlebear about the course linkage process with CDKC and MSU.

This semester, AGSC 465R students are working with the villages of Sanambele, Mali and Nomayos, Cameroon. Students will present their research on December 4 from 4-7 pm in the Thayer Conference Room in the Plant BioScience Building. The public is welcome to attend.

Spring semester, the course will be for honors students only. It will meet alternate Thursdays and early in the semester students will be introduced to the Northern Cheyenne and Apsaalooke communities. Over spring break, students will live on the Wind River Reservation in Washakie, Wyoming with the family of the instructor, Jason Baldes, enrolled member of the Eastern Shoshone.

Filming in the Schutter Diagnostic Lab
Recently, MSU Communications did several hours of filming in the Schutter Diagnostic Lab and at a farm near Churchill showing the extension activities that take place in that lab and how they benefit the state. They will use what they filmed to put together a commercial to be aired at the Cat-Griz game on November 22.

Hopa Mountain and by our course as a young leader making a difference in the community by putting his vision of a botanical park in central Lame Deer into action and serving as a model for reservation-based, off the grid entrepreneurship.



AGSC 465R Students sample wild chokecherry sauce they gathered at Dunkel's farm/garden and prepared in class instructed by their Northern Cheyenne site mentor, Sierra Alexander (MSU Environmental Studies). From left: Sebastiaan Stokhof de Jong (Sustainable Foods), Sierra, Michael Logatto (Horticulture), Cassandra Lieffers (Sustainable Foods).

After a visit to teaching assistant and site mentor, Sierra Alexander's family and off-the-grid home on the Reservation, we tasted pizza hot off the hand-made stone oven at the Rezzeria. The Rezzeria is the only Lame Deer restaurant (other than the Casino). Its revenue supports Meredith's work on restoring the botanical park in Lame Deer and in providing a way for local youth to learn entrepreneurial skills. For dinner at the Lodge, Northern Cheyenne ethnobotanist, Linwood Tallbull, joined us to share traditional plant uses.



Filming in the Schutter Diagnostic Lab. Photo courtesy of R.J. Sinclair.

Years of Service Honorees

Recently, MSU honored all classified and professional employees that reached a five year increment of service as of June, 2014. Following is a list of the honorees from our Department:

Ron Ramsfield	41.04
Ron Larson	39.23
Sue Brumfield	35.49
Susan Siemsen	27.19
Nancy Blake	25.99
Pam Szelmeczka	25.99
Petrea Hofer	25.9
Bridget Westfall	25.65
Elaine Nichols	24.99
Eileen Carpenter	24.5
Irene Decker	20.67
James Berg	19.94
Nina Zidack	19.67
Jackie Kennedy	19.43
Harvey TeSlaa	17.91
Deanna Nash	16.86
Susan Couch	16.85
Andrew Hogg	10.08
Ruth O'Neill	9.75
Toby Day	8.83
Jinling Kang	8.38
Jill Scarson	7.58
Jeff Johnston	7.49
Deanna Crow	7.28
Heather Rimel	6.96
Kimberly Prosek	6.70
Tamara Parnell	6.26
Jamie Snyder	5.87

Thank you for all your contributions to this Department and MSU!

Horticulture Students Earn Certification By Bill Hoch

Three Environmental Horticulture students recently passed the Montana Nursery & Landscape Association Certified Plant Professional (CPP) examination and received their CPP certification. Scott Samson, Samantha Jo Smith and Easton Volz successfully completed the plant identification segment of the CPP examination on Sept. 20th, and had previously passed the written segment in May. Congratulations to each of you!



Scott Samson, Samantha Samson and Easton Volz

Course Focus

Alan Dyer - BIOM 421 - Concepts in Plant Pathology



Plant Pathology is ultimately about people. If you choose a career in plant pathology, you will witness catastrophic crop losses and come to understand the impacts plant diseases can have on human lives and communities. You will talk

with the grower distraught over losing his crop and possibly his land and livelihood. You will meet with the mental health professional from a small rural community and they will tell you about the pressures crop failures place on family and community structures. While barely a blip on the American psyche, you will understand why plant pathologist/breeder, Dr. Norman Borlaug, was awarded the Nobel Peace Prize in 1998. It is because on a global scale, plant sciences and plant pathology are important, and that is why they exist!

Given the human impacts alone, you should be interested in plant pathology but it is more than that. Plant pathology is complex and fascinating; relating to a plethora of disciplines to provide a practical understanding of complex situations. Where else may one talk about chemistry, physics, ecology, zoology, botany, microbiology, mycology, virology.....and still be talking about a single scientific discipline. Regardless of your interests....your curiosities... or scientific passions, you should be able to find a place in plant pathology.

To start your journey as a budding plant pathologist, BIOM 421 "Concepts in Plant Pathology" is an excellent first step. The course provides a global view of plant pathology as well as a foundation of understanding for agricultural producers and anyone serious about the plant sciences. The course starts with a brief introduction into the amazing field of plant pathology, its history and primary concepts. It continues with sections delving into fungal, bacterial and viral pathogens as well as parasitic nematodes, parasitic plants and abiotic injuries. Because fungal pathogens cause the majority of plant diseases, they receive the majority of the focus; therefore, you will obtain a rudimentary training in mycology as well. The lectures for this course start with a brief review of the previous lecture followed by new materials and concepts. Throughout

the review and lecture, you will be expected to orally answer questions relevant to the current materials. Lectures are reinforced by laboratory materials organized by Erin Troth and myself. Ultimately, as a student in the class, you will become familiar with the major groups of plant pathogens, how plants defend themselves and how disease concepts can be applied to achieve successful disease management. We constantly strive to keep this course fresh, simple and practical.

A New Course

BIOB 280 - Miracle molds, Magical Mushrooms: Fungi in our World

This course is a presentation of fungi and their roles in nature and in shaping past and present civilizations. This course also includes the historical and practical significance of fungi as decayers of organic matter, as pathogens of plants and animals, as food, and as sources of mind-altering chemicals will be emphasized.

Spring 2015 3 credits T Th 12:30 to 2:00 pm.
Instructor: Dr. Cathy Cripps

New Employees

Zhiwei Chen (Li Huang)



I'm Zhiwei Chen, a visiting scholar in the Huang Lab. I came to Bozeman in June 2014. My project here involves the study of mechanisms of rust resistance in wheat.

I was born and raised in Jiangsu Province, China. My hometown Liyang, which is

rich in fish and rice, is now famous for one of its lakes, Tianmu Lake. I received my bachelor's degree in Biotechnology and my master's degree in Crop Genetics and Breeding under the supervision of Professor Hongsheng Zhang at Nanjing Agricultural University, Jiangsu, China. I started my career at the Biotech Research Institute of Shanghai Academy of Agricultural Sciences. During 2012, I was a visiting scholar in the Department of Plant Biology and Crop Science of Rothamsted, United Kingdom for one year under the supervision of Professor Nigel G. Halford.

During the research for my Master's degree, I focused on CBL-CIPK mediated responses under biotic and abiotic stresses in rice, and QTL mapping for salt tolerance in rice. During my early career, I switched my research focus from rice to barley, mainly on the collection of barley germplasm, characterization on genetic,

conventional and molecular breeding, molecular mechanisms of abiotic stresses, and so on. During the one year in Rothamsted, my research was focused on the study of SnRKs related signal pathways at the grain filling stage in barley. Now once again, I am switching my research work from barley to wheat. I believe that I will benefit from the research experience on multi-crop systems and multi-cultural environments.

In my spare time, I enjoy hiking, travelling, swimming and so on. I am also interested in different cultures and human customs in different countries or areas.

Funding for Potato Research By Nina Zidack

The MSU Potato Lab is a cooperator in a National Potato Virus Project funded by the USDA Specialty Crop Research Initiative. The five year project will focus on "Biological and Economic Impacts of Emerging Potato Tuber Necrotic Viruses and the Development of Comprehensive and Sustainable Management Practices".

This \$8.4 million project has 26 co-investigators from across the United States and it will address basic and applied aspects of potato virus biology, epidemiology and management. Montana will be participating by evaluating direct tuber testing protocols utilizing Real-time PCR in comparison to field based Post Harvest testing, contributing to an inspector training school in Othello, Washington, and providing historical data for development of risk models for PVY.

The Potato Lab, in cooperation with Michelle Flenniken, has also been funded to explore the susceptibility of different generations of potato to PVY. The grant is funded by the Specialty Crops Block Grant Program. Elisa Boyd will perform research on this topic for her Master's program.

Montana, USDA Award Nearly \$1 Million in Specialty Crop Block Grants By Jayson O'Neill, MDA

Helena, Mont. – The Montana Department of Agriculture and U.S. Department of Agriculture (USDA) have selected the recipients of the 2014 Specialty Crop Block Grants. Overall, eleven entities involved with specialty crops met the grant qualifications and will receive some \$986,000 in grant funds to help advance agriculture in Montana.

Specialty crops are fruits and vegetables, culinary and medicinal herbs, horticultural,

and nursery crops, including floriculture. Plants must be intensively cultivated and used by people for food, medicinal purposes and/or aesthetic gratification. Eligible projects must solely enhance the competitiveness of specialty crops in either domestic or foreign markets. More information on specialty crops and eligibility is available on the department's [website](#).

"With the growth in specialty crops like lentils and dry peas, the state tripled the amount of grant funding available from USDA. We are excited to get this money out the door and on the ground to help advance Montana agriculture," said Montana Department of Agriculture Director Ron de Yong.

For the last two years, Montana has been one of the leading producers of lentils and dry peas according to USDA National Agriculture Statistics Service. In addition, crop diversification with specialty crops and other crops have been a part of the 51 percent increase in the value of agriculture over the last five years.

Recipients of the 2014 Specialty Crop Block Grants from PSPP:

Schutter Diagnostic Lab, "Detection of Fungicide Resistant Ascochyta Blight"

Montana Seed Potato Certification Lab, "Evaluating Generation Resistance to Potato Virus Y in Potatoes"

Flenniken Lab, "Montana Bee Viruses: Identification and Transmission"

PSPP Dept., "Northern Plains Vegetable Variety Testing"

Grants

Mac Burgess, Montana Department of Agriculture, "Northern Plains Vegetable Variety Testing"

Publications

G. Bellante, S.L. Powell, R.L. Lawrence, K.S. Repasky, and T. Dougher (2014) Hyperspectral Detection of a Subsurface CO₂ Leak in the Presence of Water Stressed Vegetation. PLoS ONE. DOI: 10.1371/journal.pone.0108299 <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0108299>

Larsson, E., Vauras, J., and C.L. Cripps. 2014. *Inocybe leiocephala*, a species with an intercontinental distribution range –

disentangling the *I. leiocephala* – *subbrunnea* – *catalaunica* morphological species complex. *Karstenia* 54: 15–39.

Invited Talks

Mary Burrows, Plant Pathology Society of Alberta meeting, Canmore, Alberta, Canada, October 28, 2014. "Wheat streak mosaic virus: Research, Extension, and Education."

Cathy Cripps, North American Mycological Association Meeting, Eatonsville, WA. 2014. "Arctic and alpine ectomycorrhizal fungi: What's happening above treeline?"

Barry Jacobsen, International Biological Control Congress, Beijing China, Oct 18, 2014. "Identification and commercialization of a unique strain of *Bacillus mycoides*, induced resistance mode of action, and use in IPM programs".

Barry Jacobsen, Syngenta Root Health Symposium, Vero Beach, Florida. 2014 "Integrated Use of Seed Treatment - in-furrow and band applied fungicides for control of *Rhizoctonia* Crown and Root Rot of Sugarbeet and *Rhizoctonia* and Black Dot Diseases of Potato."

Cover Photo taken by Strobel

The cover photo of *Microbial Ecology*: Volume 68:3 2014 was taken by Gary Strobel. Following is an explanation of the

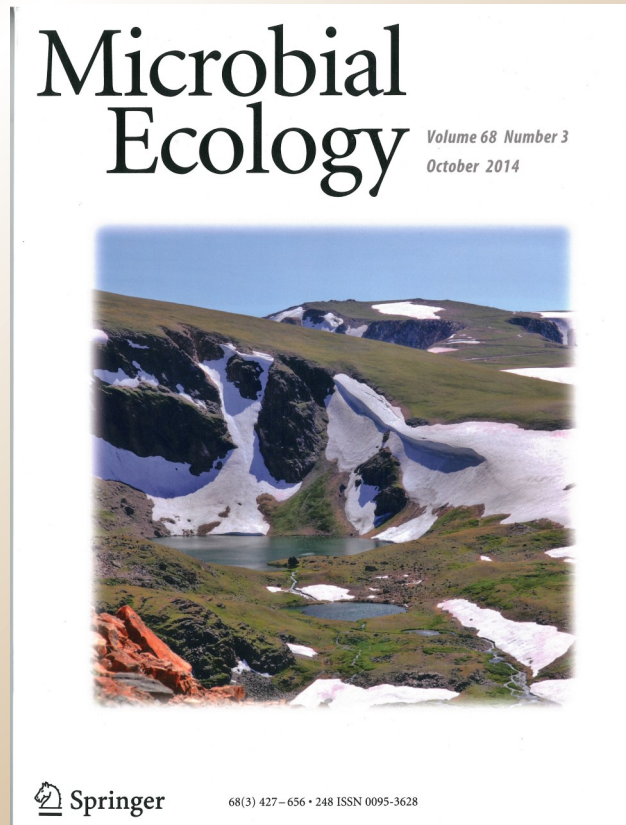


photo: Watermelon or pink snow occurs during the summer months in alpine and coastal polar regions worldwide. It is prevalent in the glaciers and snowfield in the beartooth or Absaroka wilderness (location for the photograph) area adjoining the northeast section area of Yellowstone National Park in Montana, as well as higher elevations in the Sierra Nevada range in California and select in other areas of the Rocky Mountains.

Chlamydomonas nivalis is the ultimate contributor to the phenomenon. It is a green alga that produces a red pigment, protecting its chloroplasts from intense visible and ultraviolet radiation. The first accounts of pink snow appeared in the writings of Aristotle, but initially, the most intensive investigations on this effect were made by Captain John Ross in 1818 who observed crimson snow that streaked the white cliffs like streams of blood as they were rounding Cape Yourk on the northwest coast of Greenland. A landing party stopped and brought back samples to England. It is a beautiful example of the visible influence of microorganisms on our environment. Photo courtesy of Gary Strobel.

Heritage Orchards
By Toby Day
Extension Horticulturist



There are remnants of fruit tree orchards located across the state. A new grant through the Montana Department of Agriculture Specialty Crop Block funding will allow MSU to research these orchards for desirable cultivars no longer available, disease and insect resistance, and propagation for

future generations.

Brent Sarchet, MSU Extension agent in Lewis and Clark County, and I received the grant for a three year study of many of the orchards located throughout the state. There are currently over two dozen orchards that we have looked at, and there are some promising results coming from the orchards. For instance, I saw several trees in an orchard near Townsend, Montana, that were growing in amongst junipers, yet there were no signs of cedar-apple rust. Coincidence? Maybe? However, there were several apple cultivars surrounded by Junipers with Cedar apple rust teliohorns and I saw very little rust.

At another site, there were trees that were

around 100-years old that have thrived with minimal care, if any. I have also seen nearly a dozen different apple trees in Gardiner that have survived and even produce great fruit – that all ripen at different times. One tasted very similar to a Granny Smith apple. Is this something we already have, or should it be brought back to our nurseries?

For an orchard to be considered for the study, the trees must be over 50 years old, have at least six remaining trees and the landowner’s willingness to allow MSU Extension and their partners or contractors onto their property to conduct research. If you or someone you know has an orchard that you would like us to look at, visit the site <https://www.surveymonkey.com/s/RCX23J8> or contact me at toby.day@montana.edu

The grant allows for genetic testing, and eventually propagating the trees (if applicable) with some of the proceeds going back to the landowner. I am really excited about this project and look forward to seeing more orchards as I travel the state.



Chief Plenty Coup Orchard, Chief Plenty Coup State Park, Pryor, MT (1903)

Recipe of the Month
Gourmet Sweet Potato Classic

- 5 sweet potatoes
- 1/4 t salt
- 1/4 c butter
- 2 eggs
- 1 t vanilla
- 1/2 t cinnamon
- 1/2 c white sugar
- 2 T heavy cream
- 1/4 c butter
- 3 T flour



3/4 c packed brown sugar
1/2 t chopped pecans
Preheat oven to 350. Lightly grease a 9x13 inch baking pan. Bake sweet potatoes 35 minutes or until they begin to soften. Cool slightly, peel, and mash.

In a large bowl, mix the mashed sweet potatoes, salt, 1/4 c butter, eggs, vanilla extract, cinnamon, sugar, and heavy cream. Transfer to the prepared baking dish.

In a medium bowl, combine 1/4 c butter, flour, brown sugar, and chopped pecans. Mix with a pastry blender or your finger to the consistency of course meal. Sprinkle over the sweet potato mixture. Bake 30 minutes until topping is crisp and lightly browned.

November Birthdays

Jim Berg	4
Jack Martin	8
Norm Weeden	12
Emby Davich	15
Harvey TeSlaa	15
Charissa Bujak	26
Ryan Thum	30

