Plant Science Says

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Celebrate Agriculture!

Join Montana State University's College of Agriculture and the Montana Agricultural Experiment Station as they *Celebrate Agriculture!!* October 26-27. Activities include an Agricultural Economics Outlook Conference Friday morning followed by an Ag Fair in the Strand Union Building from 2:00 to 5:00 p.m. Agriculture experts from around Montana will share information and explore the latest research results. Friday culminates with the presentation of the Outstanding Ag Leaders for 2012 and a no-host social hour in the SUB Ballroom. The celebration continues Saturday morning with a Blue and Gold Breakfast with President Cruzado. For more information contact Lisa Duffey at (406) 994 -3683.

An Overview of Research at the Post Farm
By David Gettel

Greetings from the Farm Operations Manager. As most of you probably know, I spend the majority of my time at the Arthur H. Post Farm, which I consider to be the flagship Agricultural Experiment Station for the Montana State University in the Bozeman area. The Post Farm is located about four miles west of Bozeman on the north side of Huffine Lane. It is about 250 acres in size and is split into 55 different fields of various sizes. Many, but not all, of these fields are irrigated. The first several months at my new job have been both rewarding and challenging. The dozens of Montana State University employees that I have worked with have been a real joy. They all seem to enjoy their work, and they have helped and encouraged me in mine. Of course, they have also given me plenty to do. There are many different types of agricultural experimentation and research going on at the Post Farm. Much of the research is being repeated at the Lutz Farm, located in the Spring Hill area, and at the Fort Ellis Experiment Station, located east of Bozeman. In a nutshell, I would describe my job as one that enables all of the people I work with, to be able to conduct their research. That being said, the fact that this has been one of the dryer years on record, has kept me and my co-workers busy irrigating all season and now into the fall. I am also trying to modify some of the farming practices as to better protect the soil resource. I am also busy repairing, modifying, and fabricating equipment.

I would like to briefly describe some of the major work that goes on at the Post Farm and subsequently at the Lutz Farm and the Fort Ellis Station. I don't mean to offend

Harvesting Foundation Bearpaw Winter wheat at the Fort Ellis Experiment Station with my son, Rudy Gettel at the controls. Photo courtesy of David Gettel.

anyone if you are left out of this writing. It's just that there are so many people and projects that it's hard to keep it all in mind. Also, my farming background does cause me to be somewhat biased.

One of the six wheel lines at the Post Farm along with the ever present smoke and one of the few rainbows we saw this summer. Photo courtesy of Jeff Johnston

My summer Post Farm help—Stephanie Swanson, Rebecca Van Dam, Jered Fabricius, and Nate TeSlaa. Photo courtesy of David Gettel.

The winter wheat breeding program is the first thing I'll talk about. The key people are Phil Bruckner, Jim Berg and Ron Ramsfield. Their goal is to develop new varieties of winter wheat through extensive breeding programs. They breed and choose varieties that are a good fit for Montana winter wheat growers. They try to develop varieties that fit our climate, that are resistant to common diseases and pests, and that have a high yield potential with good milling and baking qualities. It takes many years, and thousands of different varieties to come up with one that is a fit for Montana.

A Taiwanese Trade Team with Jim Berg giving a talk and Kim Falcon in the foreground. Photo courtesy of David Gettel.

The spring wheat breeding program is the next thing that comes to mind. Its goals and scope are similar to the winter wheat program except that they work with spring wheat and durum varieties. The main people involved with spring wheat are Luther Talbert and Susan Lanning. They work hard to come up with spring wheat varieties that work well in Montana and that also satisfy the requirements of foreign customers.

Susan Lanning is harvesting with the Wintersteiger combine. Becky Hattersley is assisting with changing the plot bags for the combine. Photo courtesy of Jeff Johnston.

The barley breeding program is headed up by Tom Blake. Earlier in the year, Stan Bates did a lot of work out here and after he left to go to work for Monsanto, I got to work quite closely with Duke Pauli, who is

working on his doctorate degree while working with barley. These people develop and study new varieties of barley, including those that are used for malting, forage, feed, and human consumption.

The spin off from the cereal grain breeding programs is the Foundation Seed Program. Once the winter wheat, spring wheat, or barley breeding programs have come up with a variety that is ready to release to the public, it enters the foundation seed program. Here the seed is planted on a larger scale to ramp up the volume. During the growing season, it is closely monitored to make sure it is a pure stand of seed. These fields are walked several times to rouge out anything that isn't that variety.

Conditioning seed at the Post Farm Seed Facility. Photo courtesy of Jeff Johnston.

Bill Grey and Eric Olsen taking a wheat sample of the variety Judee for submission to the MSU Seed Lab where it is analyzed for purity and germination. The foundation seed of this variety will be sold to members of the Montana Seed Grower's Association. Photo courtesy of Jeff Johnston.

It is also important to have an immaculately clean combine before harvesting foundation seed. Bill Grey is the head of the Foundation Seed program and he gets great help from Eric Olsen. The Foundation Seed program works closely with Ron Larson at the Montana Seed Growers Association.

The next major project is that dealing with weed control. Fabian Menalled and Ed Davis work with weed pressure in almost any kind of crop that will grow in Montana, including cereal grains, oilseed crops and pulse crops. They work extensively with herbicides and monitor the effect of them on both the crop and the target weed species.

Perry Miller and Jeff Holmes are conducting a major study on cropping systems. It includes cereal grains, corn, pulse crops and oilseed crops under several different rotations. Their systems encompass organic, no-till, fallow and continuous crop systems. They are hoping to find systems that are both an environmental and economic fit for Montana farmers.

Alan Dyer, Jeff Johnston, Mary Burrows, and Matt Moffet are all working on projects that study effects and controls of pathogens and diseases that are problems for Montana crops. These studies include the use of seed treatments, foliar applications of fungicides, and crops that are resistant to the different diseases.

Alan Dyer's owl hard at work deterring birds. Photo courtesy of Jeff Johnston.

Mike Giroux has a project that includes cereal grains and genetics. Mike's project usually involves taking his spring seeded grain back to the lab to study how the genetics of each variety are tied to both yield and the ability of the plant to produce high quality food and other end products.

Dave Sands has a project that includes several studies. He is studying biological control of certain pests, high quality oilseed crops such as camelina, and gluten free cereal grains such as naked oats.

Kevin Wanner, Annuar Morales-Rodriguez, and Ruth O'neill have a new project at the Post Farm that involves the study of wireworms. They have set up a study area in one of our buildings where they extract wireworms from the many hundreds of wireworm traps that are collected throughout the state. I was surprised to learn how widespread the wireworm pressure is and that there is virtually no crop that is immune to them.

There are quite a few other small scale projects going on at the Post Farm that I am not too familiar with. Some involve locoweed, brome grass, toadflax, and resistant wild oats. There are also other studies that involve fertilizers and soil fertility. As you can tell, there's a lot going on at the MSU Experiment Station Properties and it is all focused on improving Montana agriculture. Come out and visit us at any time so you can have a firsthand look at what is going on.

Post Farm Field Day. Photo courtesy of David Gettel

9th International Symposium on Arctic-Alpine Fungi in Finland
By Cathy Cripps

The 1st International Symposium on Arctic-Alpine Mycology (ISAM) started in 1980 with a meeting in Barrow, Alaska. ISAMs have been held every four years since then in an Arctic or an alpine habitat in the northern hemisphere. Meetings are limited to 20-25 qualified researchers and participation is strictly by invitation only. The purpose is to promote Arctic-Alpine Mycology as a discipline and to produce a journal volume or book after each symposium. This past August, ISAM 9 was held in northern Finland and I was thrilled to be an invited participant once again.

ISAM Group. Photo courtesy of Cathy Cripps.

It is a long way to Arctic Finland and flights went through Paris to Helsinki, followed by a long flight north to the tiny town of Ivalo. Finland is about the length of California and it was interesting to fly over the vast forests, first comprised of conifers and then of birch, which stretched from horizon to horizon. My husband and I were picked up at the tiny Ivalo airport by a taxi and driven another two hours almost to Finland's northern border in Lapland. Along the way, large reindeer in velvet kept appearing and

Cathy in Arctic habitat overlooking forests. Photo courtesy of Cathy Cripps.

disappearing at the forest edge; the pure white ones looked like ghost animals. We finally arrived at the Kevo Research Station (69^0N latitude in the Arctic Circle) in the northern area of Finland called Lapland.

The Kevo Research Station was initiated by famous Arctic mycologist Paavo Kallio who is buried on the site. Numerous botanical and mycological studies are underway at the station. The species list for fungi is one of the most extensive for any area on earth due to dedicated regional mycologists. The station itself is located on a lake surrounded by birch, however; each day we traveled north to higher elevations to collect arctic-alpine fungi. One day was spent in Norway, above the inlets of the Arctic Ocean. Evenings were spent in the lab describing and processing our precious finds. On the last day we gave talks about our proposed papers for the journal volume we will produce together.

Finland is not known for its cuisine and the meals we were served for breakfast and lunch confirmed this with a consistent offering of bread, sliced cucumbers, sliced tomatoes, cheese and cold meats. For breakfast, the bread was toasted and for lunch it was not, otherwise it was the same food for both meals. Occasionally, one of my favorite foods, pickled herring, showed up for breakfast. Dinners were more interesting and the reindeer stew and fish (salmon) soup were good hearty fare, along with more bread. The Wild Mushroom Chanterelle soup was particularly delicious with its creamy blend of *Craterellus cornucopoides* (black chanterelles) and *Cantharellus cibarius* (golden chanterelles). The Finnish 'layer cake' is to die for, since it is mostly layers of whipped cream and berries with not so much cake. The cloud and lingon berries are a delight, whether eaten in a dessert or picked fresh in the field.

The center of Finnish culture is the Sauna. It is more than just a place to 'sweat' in hot air produced by heated rocks. It is a spiritual center for families, groups, and individuals. In the old days, babies were birthed in the saunas and some in our group were old enough to call a sauna their place of birth. Of course, after each sauna, it is required to jump in the cold lake (even late at night). The tiny cozy room adjacent to the sauna had a small stone fireplace for grilling sausages afterwards.

The Sami (or Laplanders) are the indigenous people inhabiting the Arctic areas of northern Sweden, Norway, Finland, and the Kola Peninsula of Russia. They were once completely nomadic, following the reindeer from pasture to pasture, but are now trying new management techniques. Rounding up reindeer only twice a year allows them to live in permanent locations, but is disrupting their culture as the men leave to herd for weeks at a time. We were

White reindeer. Photo courtesy of Cathy Cripps

Artic mushroom. Photo courtesy of Cathy Cripps

fortunate enough to visit one of the new reindeer management facilities where a native explained the new methods. He also told us of the importance of reindeer lichen and mushrooms as food for the reindeer, especially in the Fall. I think it was a subtle way of telling us not to pick too many mushrooms!

Sami singer. Photo courtesy of Cathy Cripps

On the last night we visited a teepee-like structure which was a Sami hut built for portability. The fire inside kept us snug from the rain as a Sami singer vocalized several "Joiks" or chant-songs in deep tones accompanied by drumming. A 'joik' is often made for a person at the time he is born and is used to express ancestry or personal traits. The international group sat around the fire listening, and eventually other 'drinks' showed up as we moved into another kind of communal experience. I find Arctic cultures fascinating, and like the Arctic mushrooms, many aspects appear to be circumpolar in distribution.

Hort Farm Barn Update

The Grand Opening for the new barn at the Horticulture Farm was held on Friday, August 31. Approximately 30-40 visitors stopped by for a tour and a rootbeer float. Following are photos of the completed facility.

The new barn at the Hort Farm. Photo courtesy of David Baumbauer.

Photo courtesy of David Baumbauer

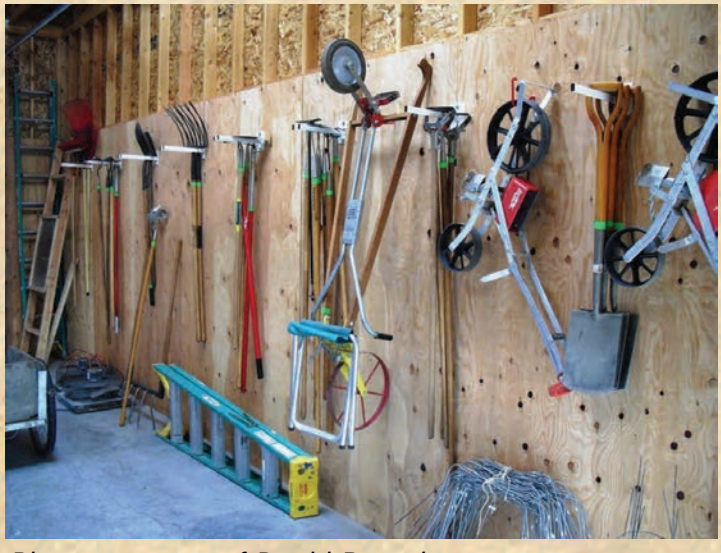
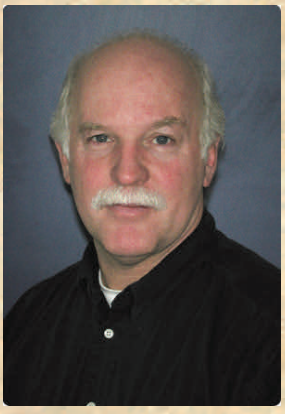


Photo courtesy of David Baumbauer

Class Focus
BIOO 465 - Insect Identification - Mike Ivie



Students working with insects have to be able to identify them from among the bewildering array of possibilities. When you realize that there are more beetle species alone than all the vascular plants together, and insect genera with important pest species may have nearly 3,000 species, the scale of this problem becomes apparent. Unlike small groups of animals like mammals, birds and fish, there are no species level guides to insects. The point of this class is therefore to allow family-level identification, not based on memorization, but on skill with the tools used by insect systematists everyday to solve the puzzle of "What in the world is that?" At the end of the semester, students are responsible for being able to place any of the 95,000 species of North American insects into the correct one of 698 families. Therefore, the faint of heart do not take Insect Identification. The majority who do are Entomology graduate students, with a significant number of undergraduate Entomology minors. A few brave souls from other fields are always welcome.

BIOO 465 is designed to provide students an entrée into the world of insect evolution and taxonomy. The lecture emphasizes the phylogenetic relationships of the insect Orders, and prepares the student to use evolutionary patterns as a basis for recognizing unknown species when they encounter them. These lectures are based on the text Evolution of the Insects by Grimaldi and Engel, as well as current journal literature. The lab utilizes a teaching collection of over 10,000 specimens of some 400 families of insects and related terrestrial arthropods from all over the world, and provides an introduction to using keys to identify them. For this task, the text is the 7th edition of Borror and DeLong's Introduction to the Study of the Insects by Triplehorn and Johnson. Specialist guest instructors provide in-depth expertise in both lecture and lab work, most notably by Dr. Justin Runyon of the USFS, who teaches the notoriously difficult Diptera (flies) module.

Given that every student in BIOO 465 will spend a very, very large number of hours at a dissecting scope during the semester, it is important that quality optics are available. In Insect Id, each student is assigned a Wild M3C dissecting scope with 16X oculars, and a fiber optic illuminator, giving them the tools needed for professional level taxonomic determinations. A Wild double-headed teaching scope allows one-on-one instruction of difficult character interpretation.

Students meet for three lectures and three lab periods each week. In addition, the lab is open for extended hours for those who wish to utilize it. It is rare for a student to not take advantage of those extra hours.

Maintaining the quality of the teaching collection in an on-going task. We are quite proud of this resource, which has many rare groups never handled or even seen in classes in far larger entomology programs. It is impossible to have students use these delicate specimens without damage. Since every student has already been through Kevin O'Neill's BIOO 262 Introduction to Entomology, they have already learned to handle specimens safely, but accidents are inevitable. Material in the collection is derived from research trips made throughout Montana, North America and to some extent, the world. It is far easier to see characters on a 1 cm long thrips from New Zealand than a 1.5 mm long one of the same family from Montana, so the broad base of this collection is critical to the quality of the class. New specimens are added constantly, but there is always a need for better and additional representatives.

It is my goal that every student who comes through Insect Identification is confident of their ability to handle the challenge of dealing with insect biodiversity. Our

students have an established reputation for excellence that allows them to succeed in both immediate careers and further academic training in top programs.

New Graduate Students
Jaya K.C. - Prashant Jha, Advisor

Hello everyone, My name is Jaya Ram KC and I'm from Nepal, the land of Mount Everest and Buddha. Bozeman has been a very good experience for me so far as it's very similar to my hometown of Kathmandu, Nepal which also has lots of mountains and greenery. I received a BS in Agriculture from Tribhuvan University in Nepal and I received an MS in Plant Science from California State University, Fresno last spring. I joined the Plant Science and Plant Pathology Department at Montana State University this past summer. I am working towards a PhD in weed science with Dr. Prashant Jha at Southern Agriculture Research Centre in Huntley. My research project involves understanding herbicide resistance and management of selected weed/s in Montana conditions.

In my free time, I like to go fishing and boating. The biggest fish I ever caught was a 10 lb catfish near Fresno, California. I also enjoy playing guitar.

Videos
Jamie Sherman, as scientific advisor with support through the USDA NIFA funded Triticeae CAP, has facilitated the creation of three films, *Holding the future in the palm of your hand, Stopping the Wheat Stem Sawfly* and *Seeds of Hope* (posted at http://passel.unl.edu/communities/pbtn). These films are free for use in any outreach or educational setting. The film, *Holding the future in the palm of your hand*, describes the importance and joy of plant breeding and was used successfully in recruitment at minority serving institutions and has been used in undergraduate classes. Montana State University's Luther Talbert and David Weaver are featured in *Stopping the Wheat Stem Sawfly* that describes their efforts in providing resistance to the wheat stem sawfly. *Seeds of Hope* focuses on the necessity of plant breeding to provide and maintain crops with disease and pest resistance. All three films were made in collaboration with Montana State University Film School. As part of their Master Degree two students, Alain Douchinsky and Alan Franks, created the films with the aid of their advisor Dennis Aig.

Grants
Mary Burrows, "National Plant Diagnostic Network State Plan of Work for Montana". USDA and The National Institute of Food and Agriculture. $24,000.

Mary Burrows, "Plum Pox Survey", Montana Dept. of Agriculture. $3,000.

Mary Burows, Barry Jacobsen, Robert Peterson, Fabian Menaleed, Anton Bekkerman, and Zachariah Miller, "Integrated Management of Cereal Viruses". USDA. $213,658.

David Sands and Cindy Morris, "Collaborative Research: LiT: RAINS: Research on Airborne Ice". NSF. $65,963

Mike Ivie, "Stone fruit commodity survey", Montana Dept. of Agriculture, $15,815.

Master Gardener Training
By Toby Day
Extension Horticulture Associate Specialist
2012 Level 3 Master Gardener Training
This year there were 37 Master Gardeners from ten counties who participated in the Level 3 Master Gardener training August 23 -25. Training of the Master Gardeners included grafting, vegetable productions, IPM training, tours and even volunteer management. Throughout the three-day training students learned to graft tomatoes, were taught IMP techniques and proper sampling and submittal to the Schutter Diagnostic Lab, insect identification issues, volunteer management techniques, and went on tours to the Plant Growth Center, the Schutter Seed Potato Lab, Gallatin Valley Botanical and Rocky Creek Farms.

Overall the training was a huge success. Thank you David Baumbauer, Hilary Parkinson, Linnea Skoglund, Don Mathre, and Mike Ivie and his graduate students Frank Etzler and Charles Hart for making

Former Extension specialist Pete Fay gives a tour of his farm to the Level 3 Master Gardeners. Photo courtesy of Toby Day.

Local (Gallatin County) Graduates of the Level 3 Master Gardener program included: Penny Oliver (not Pictured) (left to right back row) Carol Fifer, Donna Knudson, Ginny Arnold, Heather Shijf, (left to right front row) Peggy Lynn, Tammy Young, and Janis Bar-

the program a success.

Recipe of the Month

Pumpkin Pancakes

1 1/2 c milk
1 c pumpkin puree
1 egg
2 T veg. oil
2 T vinegar
2 c flour
3 t brown sugar
2 t baking powder
1 t baking soda
1 t allspice
1 t cinnamon
1/2 t ginger

1/2 salt

In a bowl, mix together milk, pumpkin, egg, oil, and vinegar. Combine the dry ingredients in a separate bowl. Stir into the pumpkin mixture just until combined.

Heat lightly oiled griddle over medium heat. Use about 1/4 c per pancake. Brown on both sides and serve hot.

October Birthdays

Florence Dunkel	10
Bob Sharrock	11
Joanna Gress	13
Jamie Sherman	13
Erin Lonergan	22
Ed Barge	24