Plant Science Says

Volume 15, No. 6 *July, 2012*

Kyrgyzstan Group Visits Montana
by Ron Larson, Manager, Montana Seed Growers Association

As the month of June has come and gone, so has our visit with the USDA Cochran Fellowship group of eight agriculturists serving in various government positions or as producers from Kyrgyzstan. Their main focus was to be forage production and usage, but it turns out that they were interested in all of the topics we were able to cover.

Under the leadership of Jim Stanelle, Former Seed Certification Director from Colorado, the group arrived in Bozeman on June 9 and stayed until June 21. They were able to meet with producers, extension specialists and experiment station personnel for numerous presentations and lab tours, as well as finding time on a Saturday to tour parts of Yellowstone Park (including Old Faithful, of course).

Monday morning, June 11, the group began by traveling to Townsend for a tour of the Bruce Seed Farm with manager Gord Pearse. Next was a stop at Toston to visit with alfalfa seed producer Tom Helm. After lunch, they met with Lloyd Harris, grass and forb seed producer, and also stopped by the Spring Hill Sod Farm. This is an example of how their days here unfolded. Beginning Tuesday June 12, they visited a variety of labs and heard from various MSU and USDA NRCS personnel, as well as more producers.

MSU presenters or lab tours included, Ed Davis, Anuar Morales Rodriguez, Dr. Perry Miller, Dr. Mary Burrows, Dr. Linnea Skoglund, Dr. Nina Zidack and the Potato Lab, Dr. Doug Steele, Dr.Bok Sowel, Dr. Glen Duff, David Baumbauer (PGC tour) , Ron Larson, Heather Rimel, Bridget Westfall, Hiedi Hickes (Analytical Lab), Dr. Bill Layton (Vet Diagnostic Lab) and Dr. Gary Brester. USDA personnel included Dr. Jim Jacobs and Pat Hensleigh. The group attended the CARC field tour on Tuesday, June 19, where they had an opportunity to visit with President Cruzado.

Marlen Tynaliev, Akylbek Kasmaliev, Manasbet Umetaliev, Pat Hensleigh., Ulan Sultanbekov, Kubat Kaseilnov, Esenbek Kenjebaev, Robert Kadyrkulov and Dzhumgalbek Sagynov. Pat spoke with them about his duties as an agronomist with NRCS.

MSU President Waded Cruzado with Manasbet Umetaliev, Akylbek Kasmaliev, Kubat Kaseilnov, Dzhumgalbek Sagynov and Marlen Tynaliev

At Least one member of this group was interested in perhaps attending MSU as a grad student, so opportunity was taken for group members to meet with MSU personnel involved with international studies and Joel Schumacher in Ag Econ and Econ. The group also toured parts of the Post Farm with Dave Gettel and crew.

Other producers were members of the Heidema family and the Heidema Dairy (including manure composting management), Greg Leep (Forage Production and Hay Delivery Service), John Schutter, Schutter Seed Farm (potato seed and other crops) and Dale Venhuizen (purebred bull production and sales). The group also spent time at the Churchill Equipment Company for a look at some of the new forage production equipment.

Marlen Tynaliev and Hereford bull at Churchill Cattle Co.

Ulan Sutlanbekov checking out a swather at Churchill Equipment company

Thank you to Kristina Krupilnitskaya, our interpreter, and to all who spent some time with this group and presented them with such a rich experience in Montana.

Bugs vs. Beef—Pressure rises as Undergraduates Formally Debate
By Florence Dunkel

On the evening of Tuesday, April 24, undergraduates from all across campus, particularly from Animal Science flowed into the Student Union. The aroma of beef cooking and sautéed “something else,” a beautiful salad, and chocolate brownies greeted them. It was part of the pre-debate demonstrations and poster presentations of the evening. A film created by Montana Fish, Wildlife, and Parks focused the crowd and then the seriousness of the evening began.
The teams (all Biology 162CS students) and the judges all took their places. The audience picked up popcorn and punch and the debate began. The resolution statement was: Resolved: The total replacement of beef by insects as a source of food will improve protein consumption in humans and will decrease harmful environmental effects.

In the formal debate we learned that livestock production contributes to 20% of the world’s greenhouse gases (insects are minimal in this area) and insects, pound per pound are more nutritious than beef. It was clear to the audience that were the beef industry to decline we would be faced

The Insect Food Team demonstrates a Land shrimp quesidilla made with one of the most popular US land shrimp, Galleria melonella, the wax moth, a pest in bee hives.

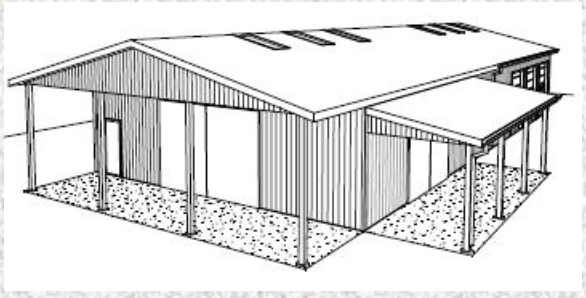
Biology 162CS students Taylor Stuck and James Schaberg on the "Land Shrimp" team prepare Galleria quesidilla in the pre-debate event. Taylor and James are masters at the task having prepared this entree for 250 people at the TEDx event at the Emerson Cultural Center earlier in the semester.

with an economic crisis due to the job market involved. However, in the Netherlands, you can now buy food insects in their counterpart of our Costco. We found out from the debaters that land and water used in insect production is minimal compared to that used for beef. Microorganisms invading insects are "entomopathogenic" or specific to insects. They are not like *E.coli* or chronic wasting disease that causes disease in humans as well. No, you cannot contract malaria by eating a mosquito with the malaria-causing protozoan inside of it!

It was a great evening. Let Irene Decker know if you would like a dvd of the event or of the MT Fish, Wildlife, and Parks film. This was all part of the University Core course in Contemporary Issues in Science, BIOO 162CS taught by Dr. Florence Dunkel. Her students debated both sides publically after excellent coaching from Animal Science (beef) professor Dr. Jane Boles and graduate students. This event was part of the way Florence teaches students to weigh the strength of evidence and to understand the research process in addressing current issues of our society.

Horticulture Construction
By David Baumbauer

A 36' by 80' barn is under construction at the Horticulture farm this summer. Kruse Enterprises broke ground on June 7 and the barn should be finished by the end of July. Features include a full concrete slab, three drive-through storage bays, and a large open work area with a vegetable wash water recovery system. The project is funded by the MAES/College of Agriculture and will provide much needed shelter for people and equipment. It is located on the site formerly occupied by the lath house.



Architect's rendering—looking from the southwest

Pouring the mono-slab

Jennifer Britton's landscape design students have designed the landscape, with installation to take place this fall. I'll be serving up root beer floats when the barn is done so look for an announcement via mail.

Mother Earth News Fair
By Cheryl Moore Gough

When Storey Publications asked me to be a presenter at the annual Mother Earth News Fair in Puyallup, Washington, I wasn't sure just what to expect, but I gamely said OK, and let them lead me through the process. The Mother Earth News Fair has been held for many years, focusing folks' attention on growing their own food, heirloom plants, preservation of foods grown, backyard chickens, bees, "sustainable" living and so on. The convention center was full of vendors, exhibits, and eight different presentation stages. Outdoors you could find cooking and carding demonstrations, alpacas, chickens, pigs and goats. I'm going to guess most of you are familiar with The Mother Earth News even if you don't want to admit it.

I presented five talks on seed saving during the two day fair, and Bob's and my last book The Complete Guide to Saving Seeds was sold out before the book signing event!

Billings Master Gardeners Plant a Tribute to Dr. Bob
By Cheryl Moore-Gough

The Billings Master Gardeners invited me to attend a tree planting ceremony to honor Bob Gough's memory, and to remember him for many years of classes and inspiration. What an honor to be included. They planted a beautiful 8' *Tilia cordata* 'Greenspire' Linden (donated by Billings Master Gardener Paul Bokoske) on the grounds of The Metra Monday Morning, June 25, on the hill overlooking the pond and "The Yellowstone Room" where he taught his classes for many years. If you happen to be at The Metra, stroll over to the pond and up the hill. There you'll find Bob's tree, with a bronze plaque:

Always In our Hearts
Bob Gough "Dr. Bob"
A Wonderful Teacher
Remembered by Yellowstone County Master Gardeners
Planted June 25, 2012

Billings Master Gardeners planting a tree for Bob at the Metra Park

Field Days

Northern Ag Research Center - Havre
Thursday, July 12, 2012

Post Farm - Bozeman
Wednesday, July 18, 2012

Eastern Ag Research Center - Sidney
Thursday, July 19, 2012

Northwestern Ag Research Center -Kalispell
Wednesday, July 25, 2012

Class Focus
BIOM 423 - Mycology and BIOE 424 – Ecology of Fungi - Cathy Cripps

These two classes are offered in Fall on alternate years: even years for Mycology (BIOM 423 listed under Microbiology) and odd years for Ecology of Fungi (BIOE 424 listed under Ecology). Sometimes the classes are hard to find on the MSU website but you can always search under Cathy Cripps as Instructor. Classes are limited to around 15 students and fill up early so if you want to take one of these courses, it is best to sign up early. Either course can be taken first as one focuses on the ecology of fungi and one on the taxonomic groups. I have had many students take both courses to gain a better understanding of fungi. The courses are intended for advanced undergraduates (juniors and seniors) and graduate students although post docs and researchers have attended sections of the course. Each course consists of two lectures per week followed by a two hour lab, although we often stay around to play with fungi after the official lab period ends. Each course has two field trips to nearby habitats. These courses are electives for Plant Biotechnology, Microbial Biotechnology, Plant Pathology, Horticulture, Plant Biology, Organismal Biology, Ecology, Biochemistry, Bioengineering, Microbiology, and some LRES programs.

Introductory Mycology (BIOM 423) is an important course for students in Plant Pathology, Horticulture, Organismal Biology, Plant Biology and Microbiology. In this course, we go through all the major groups of fungi by phylum, class, order, and genus, learning fungal terminology and structures as we go; students should come away with an ability to “understand myco-speak”. There has been a misunderstanding that this is a course on ‘Mushroom Identification” which is not the case. The first part of the course does cover the Basidiomycota and there is an extended section on mushroom classification backed up by field trips for collecting, but that is only one part of the course. The next section covers the ‘molds’, primarily the Zygomycota and the asexual forms of Ascomycota. This is essential for budding plant pathologists since over 60% of plant disease is caused by fungi. Here students learn the basics which can be followed up by one of our courses in Plant Pathology. The sexual stages of Ascomycota (morels, cup fungi, Pyrenomycete pathogens) and the Chytridiomycota (water molds) are also covered. If there is time, the slime molds (primarily Myxomycota) are examined. After each lecture on a group of fungi, organisms are displayed in lab to aid in ‘hands-on’ learning which is essential for relating real specimens to textbook figures. A small collection of mushrooms and molds is also required in addition to three lecture and lab exams and several pre-announced identification quizzes.

Ecology of Fungi (BIOE 424) is a more research-oriented course often taken by our Biotechnology students, but students in LRES (restoration, etc.), Biochemistry and Bioengineering also take this course to learn how to handle fungi in the laboratory. This course starts with a section on Fungal Ecology covering fungi as decomposers of various substrates, as pathogens (primarily of plants although epidemiology is not covered), endophytes (often with a visit from Dr. Gary Strobel) and as mutualists. The latter functional group consists of fungi in association with plants (as mycorrhizal fungi), with algae (as lichens), with insects (fungus farming ants, termites and fungi, ambrosia beetles, etc.) and with mammals (as vectors for mycorrhizal spore dispersal). We briefly cover fungal Population Biology and Community Ecology. The course includes a section on basic molecular techniques for extracting fungal DNA, amplifying it with PCR and visualizing it on a gel. The goal is to use a sequence of the

ITS region for identification by using a BLAST search in GenBank. Finally, we read papers on molecular tools for ecology, isotope analysis, biogeochemical cycling and conservation of fungi. Each lecture is followed by a lab that includes techniques for handling fungi such as tissue culturing, isolation of fungi from various substrates, mushroom production, dung culturing and use of mycorrhizal methods. A large part (and highlight!) of the course consists of required individual research projects which culminate in a poster session that has been attended by professors, researchers and other students in our department. This is the really fun part of the class: learning how to set up and complete a research project and display it in poster format. Officially, we do not brew beer but there have been some interesting projects on this topic. Two lecture and lab exams are also a requirement.

Planters in the Mathre Courtyard

Once again, you may have noticed that we have several beautifully arranged planters in the Mathre Courtyard. A huge thank you to Deanna Nash for all her hard work in putting these together! Also thank you to David Baumbauer for allowing us to start many of the plants in the Plant Growth Center. If you are interested in knowing the names of the plants in the various planters, see the following pictures.

1) Lobelia – Riviera Blue
2) Bidens – Goldilocks Rocks
3) Dahlia – Akita
4) Gaura – Belleza
5) Dusty Miller
6) Petunia – Tidal Wave Cherry
7) Licorice Plant
8) Calibrachoa – Callie Orange
9) Licorice Plant – Limelight
10) Salvia – Blue Black
11) Osteospermum – Yellow
12) Lobelia –Marine Blue
13) Dahlia – Pink Karma
14) Petunias – Coral Reef

New Employees

Abdelhak Fatihi (Abdou) - Chaofu Lu

I am excited to be at Montana State University working with Dr. Chaofu Lu. I received my Ph.D. from the Institute of Molecular Physiology and Biotechnology of Plants (IMBIO) at the University of Bonn, my M.S in Horticultural Genetics and Biotechnology from the Mediterranean Agronomic Institute of Chania in Greece, and my BS in Biology from the University of Ibn Zoh in Agadir, Morocco.

Seeds are a major component of the human diet and seed oil represents a source of renewable and environmentally friendly replacement for fossil-based raw materials. Increasing the seed size and therefore storage reserve content is of major economical and agricultural importance. During my PhD research project, I was investigating the effects of alterations in the expression of seed Development genes on seed size and storage compound allocation in *Arabidopsis thaliana.* Our results (manuscript in preparation) have shown that alterations in the expression of these genes significantly affects seed size and the total amount of storage oil. Moreover, we were able to increase the seed size and oil content in transgenic Arabidopsis by ca.

30%. Joining the group of Dr. Chaofu Lu as a Postdoc will give me the opportunity to continue investigating new candidate genes and factors involved in lipid biosynthesis in oilseed crops. The future outlook of this project is the increase of oil content and the enhancement of fatty acid composition in commercially important crops.

New Graduate Students
Steven Hystad - Mike Giroux

Hello, I am Steven Hystad, originally from Great Falls, Montana. Growing up in Montana, I have had the privilege of enjoying a lifetime of astounding scenery lined with the splendor of mountain ranges coupled with rivers that offer limitless adventuring possibilities. The ability to maintain close contact with an environment offering a boundless array of outdoor activities together with a college offering exposure to a range of research based curriculum allured me to Montana State University in Bozeman. In 2012, I fulfilled the requirements to receive my undergraduate degree majoring in plant biotechnology. The faculty in the Department of Plant Sciences and Plant Pathology has and continues to inspire and expose me to exciting research that focuses on meeting the needs of Montana's agricultural issues. I am particularly interested biochemistry, molecular genetics, and the intrinsic functional qualities of traits that impact the quality of many important agricultural crops. The Giroux lab specializes in molecular genetics and cereal chemistry of small grain quality. This coming year will be a great opportunity for me to work and collaborate with the Giroux lab towards a Master's degree in Plant Science. When I cannot be found in the Giroux Lab in PBB 124, I am most likely enjoying outdoor activities such as whitewater rafting, climbing, and backpacking with my beloved Labrador, Griffey and girlfriend, Shawn.

Charles Hart—Mike Ivie

I was born and raised in Idaho Falls, Idaho. This spring, I graduated from Montana State University with a B.S. in biology and a minor in entomology. I worked with Dr. Ivie over the past two years as an Assistant Curator of the Montana Entomology Collection. My research focused on the Cerambycidae of Montana. Now, I am excited to continue work with Dr. Ivie on a West Indian beetle systematics project for my Master's in Entomology.

Aside from working as a graduate student, I enjoy insect collecting, hiking, skiing, drumming and picking the banjo. I'm looking forward to spending a few more years in the beautiful town of Bozeman.

Grants

Barry Jacobsen, Nina Zidack, Philip Hamm, and Silvia Rondon, Western Region IPM Competitive Grants, "Use of Bacillus mycoides isolate J (BmJ) induced resistance, rogueing, stylet oils and insecticides in management of Potato Virus Y", $130,625.

Hein, G., S. Wegulo, D. Namuth-Covert, D. Golick, D. Lyon, A. Zygielbuam, J. Bradshaw, S. Tatineni, R. French, R. Graybosch, M. Burrows, F. Menalled, Z. Miller, I. Grimberg, C. Rush, F. Workneh, J. Price, E. DeWolf, N. Tisserat, F. Epplin, K. Kelsey, M. McMullen. 2013-2017. "A predictive model to increase adoption of IPM of a mite-virus disease complex in wheat. USDA-NIFA". $3,375,000.

Burrows, M. 2012-2013. Management of Ascochyta blight in lentil. MDA-Specialty Crops Block Grant. $15,400.

Publications

David C. Sands; *Distinctly Montana*, "Montanans You Should Know". See the last page of this newsletter for the full article.

Allium
By Toby Day

When I think of the Fourth of July, I think of fireworks. If you are looking for fireworks or something to just "pop" in your garden next year and want something easy to grow, look no farther than ornamental *Allium*. Ornamental *Allium* are in the same plant family as onions, garlic, chives and shallots so the blooms are globe-like and sit atop a long stalk. The ball-like blooms are made up of tiny florets giving them a "fireworks-like" appearance. However, unlike onions and garlic, the blooms are so unique that people often stop when I am in my garden to ask what they are.

Allium Schubertii

Allium usually bloom just before the fourth of July, but the remaining inflorescence has visual interest well into winter. If dried, they even make great flower arrangements. The blooms can be 2-3 inches to over one foot in diameter. Flowering purple, green, to almost blue, and even pink, *Allium* are whimsical and fun plant to grow. I like to call them my "Dr. Seuss plants."

After flowering

Allium in full Bloom

Allium should be planted in the fall up to 8" deep (depending on the cultivar) in a well-drained soil that gets full sun. Many are hardy to USDA hardiness zone 4 and will survive our climate, especially if they are mulched. They will only flower once per season, but if left in the ground each year the new bulbs will bloom the following years. There are many different ornamental *Allium* to choose from. 'Purple Sensation', 'Gladiator', and 'Globemaster' are common purple *Allium*. A smaller but "true blue" species is *Alllium caeruleum* (*azureum*). A great and unique addition is the green blooming 'Mount Everest'. However, I do have to say that my favorite is the giant pink *Allium schubertii* that is blooming in my yard right now. When photographed, it looks much like a giant fireworks display you might see on the Fourth of July.

Recipe of the Month

Watermelon Fire and Ice Salsa

This can be served with tortilla chips or used as a topping for grilled chicken or fish.

3 c chopped watermelon
1/2 c chopped green bell pepper
2 T lime juice
2 T chopped fresh cilantro
1 T chopped green onions
1 T chopped jalapeno pepper
1/2 t garlic salt

Combine all. Mix well and serve.

July Birthdays

Jinling Kang	1
Susie Couch	2
Mary Burrows	7
Andy Hogg	8
Susan Siemsen	22

MONTANANS YOU SHOULD KNOW!

DAVID SANDS

RESEARCHER, PROFESSOR

The one thing I can tell you about bacteria is… they make our smartest people look dumb.

When I am working in the lab I am…not the smelliest organism in there.

What I really love about pathogenic fungi is …they use Boolean gates just like your cell phone does.

When I was a boy I always wanted…to be able to predict the future.

The scientist I most admire…Bruce Ames (Editor's Note: Ames is a biochemist focusing on biogenetic damage in humans).

The first thing I do when I get up in the morning is… complete the nitrogen cycle.

There is nothing more relaxing than…not relaxing.

The best advice I gave my children is to…figure it out for themselves.

I've never met a weed that…a killer fungus didn't like.

Sometimes I'm unsure…about the second law of thermodynamics, living systems outwit it.

My 5 word epitaph should read…read more.

The most surprising discovery of my career was… that freshmen can be significantly smarter than professors.

Nothing makes me angrier than…running out of gas in front of a place I shouldn't be seen at.

A snowflake…how does each arm know how to look just like the other five?

My most prized, non-human possession is…any blank piece of paper and a pen with ink.

The oddest scientific discovery I ever experienced…that zinc deficiency can make you violent and that we have solutions to that problem.

People don't realize that Montana State…could easily evolve into a truly great university.

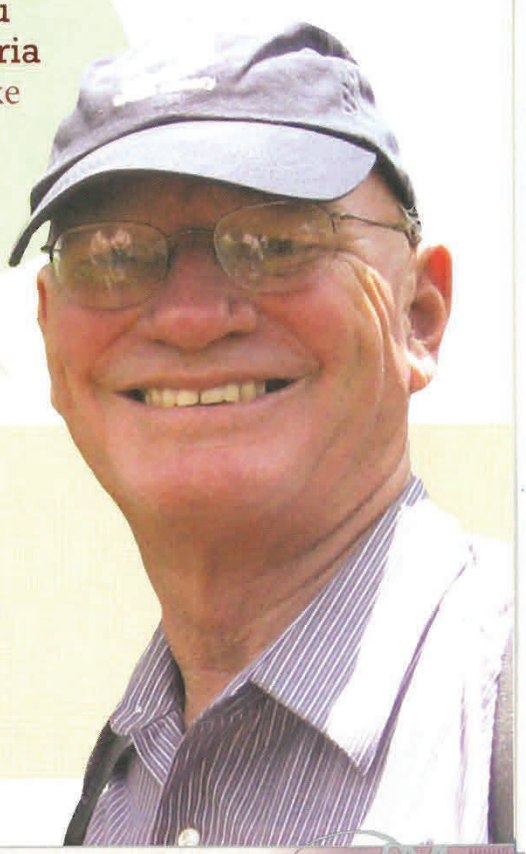
My favorite pizza topping (besides mushrooms) is… there is mushroom for improvement.

My research could change…yes I have classic symptoms of Attention Deficit Disorder.

I have a real weakness for…originality.

Thank you, David!

The one thing I can tell you about bacteria is…they make our smartest people look dumb.



DAVID SANDS, a plant pathologist at Montana State University, has worked on numerous research projects over 40 years involving enigmatic bacteria as they relate to crop diseases, as biocontrol agents of noxious weeds, and their aerial acrobatics in the clouds. Sands' group has developed new gluten-free food crops in order to aid people who cannot eat wheat. He also has a project developing a fungus to kill witchweed, the parasitic weed that prevents food production in many African countries. He sometimes writes poetry, example below.

Rainy Summer
It rained so much
The trout swam into the clouds
And left their rainbows.