Plant Science Says

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Mico-Malters in the Autoclave Room
By Hannah Estabrooks

Some of you may have noticed the new equipment in the autoclave room in the Plant BioScience Building. These are some of the first arrivals of various instruments for the newly formed MSU Barley Malt Quality Lab! Specifically, the two units are a "Steep/ Germ" and "Combi" (combined kiln and steep/germ). Jointly the two machines will allow us to micro-malt 48, 100g barley samples each week - or roughly 2500 samples a year. Malting is a tradition that historians believe pre-dates recorded history and contributed to the movement of communities from hunter/gatherers to settlements. The primary purpose of malting is to transform nearly indigestible grains into a friable ingredient for making beer (and many other food products). The malting process consists of three main steps including steeping, germination, and kilning. The steeping process consists of roughly two days where the grain is submerged for hours at a time between air rests to bring the grain moisture up to ~45% from the roughly 7-12% it was at harvest. This signals the grain into its germination phase – similar to the conditions of spring rain. The germination phase takes 3-5 days during which time the grain is kept at high humidity with occasional turning to prevent the growing rootlets from matting. During this period enzymes such as B-glucanase and proteases are working to break down the endosperm cell walls and protein matrix. This exposes the grains' starch granules making them accessible to yeasts later in the beer making process. The goal of the germination phase is to get maximum grain modification without allowing

Combi malter: Kiln on left, steep/germ on right

the acrospire (eventual shoot of a growing barley plant) to emerge and begin using the starch reserves. The final step of malting is to kiln the grain – this 24hr process is primarily a preservation act, bringing the grain moisture back down to ~4-6% and allowing the grain to be stored without worry of mold. This low/slow heat also is the process of creating a "base malt" where essential enzymes such as A-amylase are conserved to later break the grain starches into sugars for the brewing process. Craft malting – which serves the recent upsurge of craft breweries – may take the kilning step to more advanced levels involving different heating techniques to create the caramel, crystal, and chocolate malts that you would find at

your local home brew store. The two units you now see in our autoclave room automate these three phases allowing our breeding program to greatly increase the quality and volume of data generated in support of making barley selections. If you would like to know more about the malting machines and/or our program come find me and I'd love to discuss it further with you!

Annual Whitebark Pine (WBP) Ecosystem Foundation Meeting
Sept. 16-18, 2016
By Marlee Jenkins

It was inspiring to see so many people coming together in Whitefish, Montana for this year's Annual WBPEF Meeting themed Whitebark Pine – Successes and Challenges in Managing the Jewel in the Crown of the Continent. There was an impressive amount of coffee and pastries early Friday morning at the downtown O'Shaughnessey Center and the cheerful buzz of the crowd overshadowed the real reason behind the meeting – the doom and gloom of whitebark pine. After snagging some stylish conference swag and hanging up posters, Dr. Cathy Cripps, Chance Noffsinger, and I settled in for a day of presentations from leaders in the field of WBP restoration. Later in the afternoon, Cathy gave a talk updating the crowd on the use of native mycorrhizal fungi for the restoration of WBP and during the break afterwards we could barely escape the eager questions in time for a coffee refill!

Saturday's field trip began with a scenic drive up to the lodge at the base of Whitefish Mountain Ski Resort. The resort was recognized in a quick presentation for becoming the first WBP Friendly Ski Area and then we all hopped on the lift and headed for the top of the mountain. From there we set out on a short rainy hike to watch some tree climbers scale WBP trees to collect cones destined for use in the blister rust resistance breeding program. The amazing views and opportunity to watch the tree climbers were well worth the soggy expedition.

On Sunday morning, those of us that had committed to the full weekend (and late night trip back home to Bozeman) headed to the Native Plant Nursery of Glacier National Park where we grabbed some WBP seedlings and headed to the Two Medicine Lake area of the park to hike to a recent planting site. There, in the midst of heavy fall winds and beautiful scenery, we discussed current planting practices and

The crew in Two Medicine, Glacier National Park learning about WBP planting practices.

Left: Marlee Jenkins carefully planting a WBP seedling. Right: Justin Hynicka (left) from American Forests and Chance Noffsinger (right) striking their best pulaski pose.

were even able to plant some seedlings of our own. Overall, the meeting was a great success and we had no choice but to believe that WBP has a chance for a better future thanks to all of the great efforts of those in attendance.

MAES Seminar Schedule

Michelle Flenniken "Determining the role of viruses on honey bee health"
11/28—8:30 a.m. in 108 PBB

Matt Lavin "The Grasses of Montana and Phylogenetics of Legume Crop Species"
11/29 - 10:00 a.m. in 108 PBB

Jamie Sherman "Barley Breeding and Genetics"
12/6 - 1:30 p.m.

Mary Burrows "Management of Diseases in Montana Crops"
12/8 - 2:30 p.m. in 138 ABB

Florence Dunkel "Community-Based Natural Products for Pest Management"
12/9 - 1:00 p.m. in 108 PBB

Ryan Thum "Ecological genetics of invasive aquatic plants"
12/12 - 2:30 in 108 PBB

Li Huang "Functional Analysis of Rust Resistance in Wheat"
12/13 - 1:00 p.m. in 108 PBB

Bill Dyer "Molecular Approaches to Weed Physiology"
12/14 - 1:00 p.m. in 108 PBB

New Employees

Lindsey Aull

My name is Lindsey Aull and I'll be the new Towne's Harvest Garden Farm Manager for 2017. I'm currently finishing my 5th season growing certified organic produce in Stevensville, Montana, where I sell to both direct and wholesale markets. I have a B.A. in Environmental Studies from the University of Montana, Missoula with a minor in International Development Studies. When not in the thick of the growing season, I enjoy all things winter—skiing, hockey, and playing around in the snow with my border collie Lily. I look forward to getting to know the students and faculty at MSU and to a great growing season.

Course Focus
Norm Weeden – BIOB 377
Practical Genetics

What is cancer? What is genetic diversity—and what is the best way to measure it in a species? What will I learn about myself if I get my genome sequenced? What is the most dangerous environmental mutagen I am likely to encounter? Why don't I ever see a male calico cat? What genes make a leaf, or a leg—and how did scientists make those flies with a leg coming out of their head? All these are questions we address in Practical Genetics.

The goal of this course is to have you develop a practical knowledge of genetics, allowing you to perform successfully in roles requiring a general knowledge of biology, as well as to assess the importance and accuracy of genetic information/interpretations presented to you in newspapers or magazines, people in leadership positions, or your physician.

The course primarily consists of a series of lectures/discussions that are augmented by readings and problems from a standard genetics text (Concepts of Genetics by R.J. Brooker has been recommended for the last two years). The course is divided into three parts, the first third being transmission genetics (how traits are passed on from one generation to the next). We then take up DNA structure and how that molecule is amazingly well-suited for its function. Finally, in the last third of the course we apply what we have learned to

current issues or aspects of life that turn out to be intimately associated with fundamental genetic principles. Although there is no laboratory specified for the course, you will also obtain hands-on experience performing the same experiments Mendel did and analyzing your own data. Concepts such as segregation, linkage, meiosis and recombination will become second nature to you. In addition, you will become MSU's expert on the genetics of a genus of your choosing.

This course is taught each Spring Semester, and for many majors it is interchangeable with BIOB 375 (General Genetics) and has the same pre-requisites (a 100 or 200 level course in cell and molecular biology). However, the class size of BIOB 377 is about 30, while that for BIOB 375 is over 100. I do get to know every student in my class, and we do have time to discuss some of the ethical and social issues associated with DNA genotyping and other aspects of this rapidly developing field.

PSPP Journal Club News

The PSPP Journal Club would like to extend a big thank you to all the club members who volunteered their time at the 29th Annual Fall Career Fair October 5-7th!!!

Graduate students volunteered for more than 10 hours over the course of this event, raising nearly ninety dollars for the Journal Club budget and enabling us to apply for matching funding through the OSE. Knowing how busy all our members are, the Journal Club Officers really appreciated every hour club members were able to volunteer. Thanks everyone!!

One of the organizers of the Career Fair and graduate students Dylan Mangel, and Uta Stuhr volunteering at the Career Fair.

Grants

Nina Zidack, "Testing LAMP Diagnostics and Effect of Glyphosate Injury on Seed Potato Emergence", U.S. Department of Agriculture.

Michelle Flenniken, "Determining the Impact of Viruses on Honey Bee Health", U.S. Department of Agriculture.

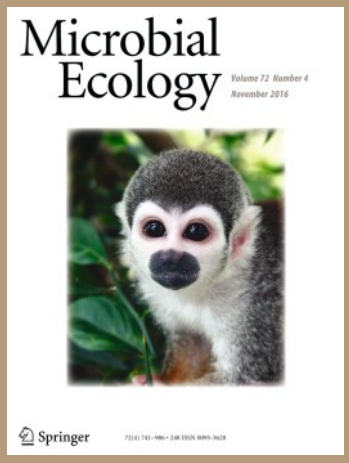
Jessica Rupp, "Early Detection of Economically Important Specialty Crop Pathogens by Hyperspectral Imaging", U.S. Department of Agriculture.

Bright Agindotan, "Survey of Montana State for Pathogens of Economic Importance in Field Peas", U.S. Department of Agriculture.

Publications

Cindy E. Morris, Soubeyrand, S., Bigg, E.K., Creamean, J.M., Sands, D.C., "Mapping rainfall feedback to reveal the potential sensitivity of precipitation to biological aerosols"

Gary Strobel



COVERPHOTO for Volume 72, Number 4 2016: Aclose up photo of the South American squirrelmonkey (Saimiri sp.) taken in the forests of the Colombian Amazon. The transmission of disease causing agents from wild animal species to humans is of global concern. The increasing destruction of wildlife habitat around the world has resulted in more frequent encounters of man with native species. Novel molecular biological approaches involving high throughput

genomics are being used to study problems of this type.

Winter House Plant Care
By Toby Day, Extension Horticulture Specialist

As we end the gardening season, our perennial beds have been cut back and the produce has been stored, canned, or eaten. The leaves are raked, the lawn fertilized, the mower is winterized and put away and the irrigation system has been blown out. The compost pile is cooking, the fruiting canes of the raspberries have been cut back and the garden is tilled. Flower pots are put away and the garden hoses are drained. All is done until next year. Or so you thought…

Despite having put your yard and garden to bed, there are always house plants that need attention, especially going into winter. Light is significantly reduced during the winter months, the air is dryer, and there are drafts from window and doors that can really affect houseplant health. So, try these simple tips to help your houseplants thrive, not just survive, during the winter months.

Watering
Houseplants don't transpire or photosynthesize as much in the winter, therefore they need much less water than in the summer months. Overwatering of houseplants, especially in the winter months, is the number one reason for houseplant death. Water sparingly, but don't let them dry out completely. Each plant has different watering needs, but I find that I water about half as much during winter. The best way to test for water is to lift the pot. If it is light, it is too dry. If heavy, wait to water. If it pooled in the saucer, dump it out so the plant isn't sitting in water.

Fertilization
Fertilization of houseplants is rarely recommended in winter months. If you have to fertilize, only use one-half the recommended amount. Remember, these plants aren't real active in winter, so they don't need much fertilizer. Once there is new growth in the spring, you can start fertilizing again.

Light
Most plants do not need much light, but in winter the amount of light in a home is reduced due to less daylight. You may want to add additional lighting, however, most just may need to be moved closer to the window. Another winter project is to remove all the dust that has accumulated on the leaves, reducing its ability to photosynthesize. I usually run my plants under the shower for a minute to wash off all the summer dust, or you can just use a sponge. A plus of doing this is the plant looks healthier too!

Temperature and Humidity
Even though the thermostat in a house is set for relatively the same temperatures 50^{o}F to 80^{o}F, there can be incredible drafts during winter. An open door or a leaky window can drop the temperature significantly. Registers and radiators can have the opposite effect by raising the temperature around plants too high. With that in mind place your houseplants away from leaky windows and especially away from outside doors, and try to keep them away from vents, registers, heating stoves or radiators. Don't let the foliage touch the glass of a window, it is way too cold for a houseplant. Finally, the air inside a house is often very dry in winter months. You may want to invest in a humidifier for areas where most of your houseplants reside.

Recipe of the Month
Slow Cooker Thanksgiving Turkey
5 slices bacon
1 (5 1/2 pound) bone-in turkey breast, skin removed
1/2 teaspoon garlic pepper
1 (10.5 ounce) can turkey gravy

2 tablespoons all-purpose flour
1 tablespoon Worcestershire sauce
1 teaspoon dried sage

Place bacon in a skillet over medium-high heat, and cook until evenly brown. Drain and crumble.

Spray a slow cooker with cooking spray. Place turkey in the slow cooker. Season with garlic pepper. In a bowl, mix the bacon, gravy, flour, Worcestershire sauce, and sage. Pour over turkey in the slow cooker.

Cover slow cooker, and cook turkey 8 hours on Low (check after 6 hours).

November Birthdays

Jim Berg	4
Jack Martin	8
Tracy Hoogland	8
Yadav Ramawatar	10
Harvey TeSlaa	15
Liz Elmore	16
Paula Guastello	16
Jeff King	20
Ryan Thum	30
Julie Zickovich	19