# Plant Science Says

September, 2004

**APS Meeting**
**By Nina Zidack**

As July came to an end, members of the Plant Pathology group traveled to Anaheim, California to attend the annual meeting of the American Phytopathological Society (APS). Hot topics at the meetings reflected both the evolution of Plant Pathology as a science, and the new role of plant pathologists on the front lines in the fight against bio-terrorism. Symposia were offered on functional genomics of both bacterial and fungal plant pathogens, with special attention given to gram positive and fastidious prokaryotes. A significant portion of the program was devoted to plant/pathogen interactions, with sessions on co-evolutionary processes of pathogens and plants, and suppression of host responses by pathogens. In the field of biological control, new discoveries on the mode of action of *Trichoderma* were reported, and the role of induced resistance is receiving greater attention. On the geopolitical front, plant pathologists shared information on "The Plant Pathologist's Toolkit for Responding to Crop Biosecurity Threats, Information Security versus Freedom of Information in Agriculture, and Microbial Forensics". In addition, attendees had a chance to peruse the hundreds of poster presentations.

On the evening of August 1, we had the honor of watching Barry Jacobsen receive the APS Fellow award. Barry was honored for his long service in Extension, research contributions in IPM, and leadership ranging from the departmental level up to the national level in USDA and APS.

**Dr. Cindy Morris, Visiting Scientist**

Dr. Cindy Morris, from the *Institut National de Recherche Agronomique* (INRA) in Avignon, France, will be at MSU for a year (Aug 2004 – Aug 2005) as a visiting scientist. She will be working conjointly with Dave Sands, the Center for Biofilm Engineering (lab of Anne Camper) and the Image and Chemical Analysis Lab in the Department of Physics. Her research will concern aerial dissemination of bacterial biofilms from plant surfaces. In particular, she will be measuring the physical forces required to break off bacterial biofilms from leaf surfaces, the role of leaf-surface properties in release of biofilms into the air, and the properties of air-borne biofilms that assure bacterial survival and long distance aerial transport. One of the long term goals of this project is to understand how leaves act as launch pads for plant-associated bacteria - and particularly ice nucleation active bacteria that could induce freezing of cloud water. If these bacteria foster precipitation via contact with cloud water, then results from this work could lead to the design of cropping strategies for enhancing rainfall.

Cindy grew up on the eastern shores of Lake Michigan, studied natural sciences, philosophy of science and computer programming as an undergraduate at the other MSU (Michigan State University) and received a PhD in Plant Pathology from the University of Wisconsin-Madison in 1985. She and her husband (another roaming plant pathologist) then obtained grants from the US National Academy of Sciences for a postdoctoral research sojourn at Beijing Agricultural University in the PRC where they stayed for 4 exciting years. After leaving

China in the wake of the student protests and government crack-down at Tianmen Square in 1989, she and her husband were hired as research scientists at INRA's Plant Pathology Research Unit in Avignon, France where they have grown roots and raised 2 sprouts (Simon 15, and Rose 12).

For the past 20 years, Cindy's research interest has concerned the ecology of bacteria on aerial plant surfaces. Plant surfaces harbor not only plant pathogenic bacteria, but also human pathogens, ice nucleation active bacteria, bacteria that are antagonists of other pathogens, etc. The apparently silent phase of saprophytic/epiphytic colonization sets the stage for the subsequent impact that these bacteria have on plant health, human health and the environment. She is interested in what governs the dynamics and structure of this epiphytic phase with a sight on how to manipulate these populations to control plant disease or enhance beneficial effects on the environment. Cindy also has a long running interest in epistemology, human nutrition and language.

Anyone interested in the details of her work can look at the publications listed below or contact her at ext 7354 (305 EPS building) or ext 1986 (Biocontrol lab).

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Boureau T., et al. 2004. Comparison of the phenotypes and genotypes of biofilm and solitary epiphytic bacterial populations on broad-leaved endive. *Microb. Ecol.* 47:87-[illegible].

Morris C.E., Monier J.-M. 2003. The ecological significance of biofilm formation by plant-associated bacteria. *Annu. Rev. Phytopathol.* 41:429-453.

Morris C.E., et al. 2002. Microbial biodiversity: approaches to experimental design and hypothesis testing in the primary scientific literature from 1975 to 1999. *Microbiol. Molec. Biol. Rev.* 66 :592-616.

Riffaud C. M.-H., Morris C.E. 2002. Detection of *Pseudomonas syringae* pv. *aptata* in irrigation water retention basins by immunofluorescence colony staining. *Eur. J. Plant. Pathol.* 108: 539-545.

Morris C.E. 2001. Phyllosphere. *In: Encyclopedia of Life Sciences, Nature Publishing Group, London,* http://www.els.net

Morris C.E., et al 2000. The relationship of host range, physiology and genotype to virulence on cantaloupe in *Pseudomonas syringae* from cantaloupe blight epidemics in France. *Phytopathology* 90: 636-646.

Morris C.E., Nguyen-Thé C. 1996. The role of plant surface bacteria in the hygienic and market quality of minimally processed vegetables. pp. 191-208 In : Morris C.E., Nicot P.C., Nguyen-Thé C. (eds.), *Aerial plant surface microbiology, Plenum Press, N.Y.*

Leifert C., et al. 1994. Ecology of microbial saprophytes and pathogens in tissue culture and field-grown plants : reasons for contamination problems in vitro. *Critical Reviews in Plant Sciences* 13:139-183.

Morris C.E., et al 1992. Ice nucleation active bacteria on Chinese cabbage in northern China : population dynamics and characteristics and their possible role in storage decay. *Phytopathology* 82:739-746.

Morris C.E., Nicot P.C. 1988. Plant Pathology in the People's Republic of China: Getting the job done. *Plant Disease* 72:648-660.


**New Graduate Students**

Jeremy Jewell (Tom Blake)
I'll be working in Tom Blake's barley genetics lab and pursuing a master of plant science degree. I graduated this summer with a bachelor of cell biology degree and a minor in chemistry. I am 26 and a Montana native.

Tim Seipel (Matt Lavin)

I am Tim Seipel, a new Master's student with Matt Lavin. I grew up in Tennessee and graduated from high school in Ohio before moving to Montana. I received a bachelor's degree in Biology here at MSU and spent a year at the University of Innsbruck, Austria. As with most people in Bozeman, I can usually find nothing better to do in my spare time than run around in the mountains doing just about anything.

My research will focus on Relative Species Abundance in sagebrush plant communities. I spent much of the summer collecting percent cover data at Burke Park in Bozeman, which I hope to analyze in the context of Steven Hubbell's book *The Unified Neutral Theory of Biodiversity and Biogeography.*

I am excited to be in Bozeman and I find Montana makes a great botany laboratory.

**New Lectern**

Room 108 now has a new lectern. Since this Department has become rather cospomolotan, it is appropriate that the new lectern be made of wood from each of the continents. It is hand made and includes woods that have been joined and inlaid. Please note that the top plate of the lecturn contains wood samples from all seven continents as follows: *Juglans nigra* (black walnut from North America is the dark brown wood in the top plate), *Prunus cerasus*, (cherry from North America occurs as the light brown wood on the top plate), *Acer* sp. (maple from Europe used as the very light wood on bottom strip on the top plate), *Diospyros dendo* (ebony from Africa placed as the black inlaid strips on the top plate), *Swietenia candollea* (South American mahogany used as the top retainers), *Shorea* sp. (meranti from Indonesia used as a bottom retainer), *Eucalyptus ptchocarpa* (bloodwood from Australia appears as the bright red strip in the top plate) and *Nothofagus antarcticus* from Patagonia (found in the Antarctic about 100 million years ago appears as the two inlaid circular discs in the upper corners of the top plate). Many of the rare foreign woods have been brought back from various parts of the world during microbe collecting trips.

The other woods in the lectern are represented by birch plywood appearing as the major front piece and the mixed walnut side pieces joined with yellowish hickory as the center piece. Pieces of Douglas fir plywood have been used as shelves and they have been trimmed with maple. A piece of alder serves as trim on the top of the birch front with a piece of walnut on the base of the front.

The lectern was prepared with blood, sweat and pain by Gary Strobel and grandson Ben this summer. It is a gift to the Department.

**Department of Plant Sciences and Plant Pathology**
**Fall 2004 Seminar Schedule**
108 Ag BioSciences Facility
Tuesdays, 4:00 p.m.

**Aug. 31** No seminar

**Sept. 7** Dr. Dave Sands, Professor of Plant Pathology, MSU - Designing Crops to Answer Human Health Problems

**Sept. 14** Dr. Cindy Morris, INRA, France - Biofilms on plant surfaces

**Sept. 21** Dr. Clayton Marlow, Professor of Animal and Range Science, MSU - Effects of Fire Suppression on Plant Community Ecology

**Sept. 28** Dr. Anna Sala, Associate Professor, Division of Biology, University of Montana - Consequences of Fire Suppression from a Physiological Perspective

**Oct. 5** Chris Mahony, MS candidate, Department of Plant Sciences and Plant Pathology, MSU - topic TBA

**Oct. 12** Dr. Uvi Castillo - Assistant Research Professor, Department of Plant Sciences and Plant Pathology - topic TBA

**Oct. 19** Dr. Bill Inskeep, Professor, Department of Land Resources and Environmental Sciences, MSU - The Geomicrobiology of Acidic Thermal Springs in Yellowstone National Park

**Oct. 26** Darin Boss, Ph.D. candidate, Department of Plant Sciences and Plant Pathology, MSU - topic TBA

**Nov. 9** Catlynn Swan, MS candidate, Department of Plant Sciences and Plant Pathology, MSU - Increased Expression of Puroindolines Slows Wheat Digestion in the Rumen

**Nov. 16** Jeff Cameron, MS candidate, Department of Plant Sciences and Plant Pathology, MSU - topic TBA

**Nov. 23** Dr. Ken Kephart, Superintendent Southern Agricultural Research Center - Developing Soybeans for Montana

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**Nov. 30** Dr. Fabian Menalled, Assistant Professor of Weed Science, Department of Land Resources and Environmental Sciences, MSU - topic TBA

**Dec. 7** Dr. Jack Riesselman, Professor of Plant Pathology, MSU - Great Plains Diagnostic Network and New APHIS Rules

**Montana Ag Live! Fall Schedule**
**The following Sundays from 7-8 p.m.:**
Sept. 19: David Baumbauer, Plant Growth Center Manager, "Bee Keeping for Fun and Profit"

Sept. 26: Dennis Cash, Extension Forage Specialist, "Forage Management"

Oct. 3: Bruce Maxwell, Weed Scientist at MSU, "Non-Traditional Weed Control Methods"

Oct. 10: Jeff Jacobsen, MSU's Dean of Agriculture, "Montana's Research Centers and the Ongoing Research Center Improvement Program"

Oct. 17: Bob Peterson, MSU Entomologist and Risk Analysis Specialist , "Montana's West Nile Virus Risk Assessment"

Oct 24: Lisa Rew, Research Weed Scientist and Ecologist, "Montana's Center for Invasive Plant Species"

**When to Harvest**
**By Bob Gough**
With temperatures dipping into the low 40s at night people are beginning to think about harvest. After all, if you were diligent and lucky enough to bring a crop along this far, you don't want to lose it to a frost. So, just when is the right time to harvest the crop? When it's ripe of course. but with many of us at this point in the year, there is a toss up as to whether to wait a little while more for the crop to ripen fully and risk losing the entire crop, or to harvest it slightly underripe and take what we get. Here are some things to remember.

Fruit crops will not tolerate a hard frost. The apples, raspberries, and perhaps strawberries that remain on the plants will freeze at about 29 F (apples) and 30 F (berries), and frozen fruit will go to mush when they thaw. (Fruit grown under drought conditions may freeze at *slightly* lower temperatures.) Therefore, harvest the crop before air temperatures get to that point. There is some feeling that letting apples "freeze" on the tree will "sweeten" them, that is, make them less astringent. This is partly true. Subjecting the fruit to bright sunny fall days and temperatures less than 40 F will help build sugars and convert some of those sugars that have already gone into starch in the apple, back into sugar. So wait as long as you can to harvest your fruit, but do so before the temperatures drop below freezing.

Vegetable crops are similar to fruit crops in that the fruit-bearing vegetables cannot tolerate frosts. Beans, tomatoes, peppers, eggplants, melons, cucumbers, pumpkins, and squash, as well as sweet corn, all freeze at about 30 F to 31 F. But there is something more sinister about these crops. Being tropical or subtropical in origin, they suffer chilling damage at temperatures less than about 40 F. Such damage will display itself in time as pitting on the fruit wall, or outright failure of the fruit to ripen properly. In either case, you won't gain much by leaving these crops in the garden when temperatures get much below 40 F. Some of them, such as tomatoes and muskmelons, will ripen off the vine PROVIDED they have begun to ripen on the vine. That is, tomatoes that show a lightened green color, or better yet, a slight blush, and melons that show a yellowing ground spot, will continue to soften and develop their red coloration off the vine. Placing them in a paper bag with an apple will speed the ripening process even more because of the ethylene the apple emits. But beware! A fruit that ripens off the vine will not develop the flavor of the fruit that ripens on the vine.

The pot herbs, such as spinach and kale, although freezing at about 31 F, withstand repeated freezing and thawing without significant damage. I've harvested kale for breakfast on a -35 F morning and taste just fine when thawed and cooked. So don't worry too much about getting these crops out of the garden anytime soon.

Carrots freeze at 29 F, parsnips, rutabagas, and turnips at 30 F, and beets and potatoes at 31 F. But these crops are protected by soil cover and can be left in the ground well into late fall. Remember, soil in the fall is far warmer than the air. The conversion of starch to sugars I mentioned as occurring in the apple happens too in these root crops when temperatures drop below 40 F. This makes them sweeter. Some folks dig their parsnips in early spring to take full advantage of this conversion. A caution,

however, applies to potatoes. In spuds subjected to temperatures below 40 F, the conversion of starch into sugar results in a dark brown or black product when the sugar is caramelized during the frying process. That's why some potato chips are a deep mahogany color.

So, to summarize, harvest most of your crops before a frost. If you sweat nervously in those last, tenuous pre-frost mornings when the thermometer reads 35 F, or 38 F, or 33 F, happy that it did not dip to 32 F and hoping for a couple of more such "lucky" days, remember that your vegetables and fruit are not ripening much once the temperature dips below 40 F anyway. Harvest what you have, before it is too late.

**Bob's Byte**

Setting Icons for Single Clicking
(Irene Decker filling in)

1. **Right-click** your **Start** button and select "**Explore**".
2. Once Windows Explorer opens, hit the **Tools menu, Folder Options**.
3. Click the **Web Style radio button** and hit OK. You may be asked to confirm you really want single-click icons.

That's it. You should be opening programs with a single-click. If you want to be more particular, select "Custom" from the folder options screen and hit the settings button. You can control just about every aspect of your icons and folders from there.

**Grants**

Barry Jaocobsen; Commercialization of BmJ; Montana Board of Research and Commercialization
Bob Sharrock; Genes Controlling inflorescence Structure in Arabidopsis; USDA

**Weddings**

Andy Hogg and Shana Moffet were married Sunday, August 8. Andy is working in Alan Dyer's lab as a research associate and Shana works at The Ridge and coaches JV volleyball for Bozeman High School.

Congratulations to you both!

Congratulations to Oliver Zietlow and Eva Grimme on their August 6th wedding! Oliver and Eva are both doctoral students with Barry Jacobsen. They will be having another ceremony in December when they are home in Germany.

**September Birthdays**

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| Tracy Dougher | 1 |
| Debbie Willits | 3 |
| Irene Decker | 5 |
| Humphrey Wanjugi | 5 |
| Oliver Zietlow | 13 |
| Melody Schimpf | 15 |
| Gary Strobel | 23 |
| Bill Dyer | 26 |
| Mark Young | 27 |
| David Baumbauer | 27 |

**Recipe of the Month**

***Banana Nut Bread with Brown Sugar Icing***

This has carbs, sugar, fat, everything. Enjoy!

1/2 cup raisins
1 cup granulated sugar
1/2 cup butter, softened
3 large bananas, mashed
2 large eggs
2 cups all-purpose flour
1 teaspoon baking powder
1 teaspoon baking soda
1/2 teaspoon salt
1/2 cup chopped pecans
1 tablespoon butter
1/4 cup firmly packed brown sugar
1/4 cup milk
1/4 cup powdered sugar

1. Preheat oven to 325°F. Grease and flour the bottom of a 9x5-inch loaf pan.
2. Soak raising in hot tap water for 10 minutes, or until plump. Drain and set aside.
3. Meanwhile, in a large bowl cream together sugar with

1/2 cup of butter until smooth. Beat in mashed bananas then eggs, one at a time until well blended. Fold in flour, baking powder, baking soda and salt until just mixed. Gently stir in pecans and reserved raisings. Pour into prepared pan and bake for 1 hour, or until a toothpick inserted in the center comes out clean. Cool on a wire rack for 10 minutes. Loosen edges with a butter knife and carefully remove from pan; cool completely on wire rack.

4. Meanwhile, in a small saucepan, melt remaining tablespoon of butter; stir in brown sugar and milk. Bring to a gentle boil and simmer for 2 minutes. Remove from heat. Stir in powdered sugar. Beat until thick. Drizzle over bread before slicing.

Makes 1 loaf.