Plant Science Says

May, 2001

Update on the Plant Disease Clinic
by Martha Mikkelson

This month, I start my tenth year in the Plant Disease Clinic. Yes, a whole decade of autopsies on root-rotted spring wheat, deceased potatoes, and cankered and bleeding aspens. By my records, about 8,200 sick and dying plants from over 300 different plant species have been mailed here from nearly every hill and vale in Montana. Determining the cause of death on such a variety of plants has [illegible] every ounce of my liberal arts, plant pathology, agriculture and hard knocks knowledge to work. And still, the problems are never as simple as they describe in the textbooks! Luckily, I have had Jack Riesselman, Barry Jacobsen, and Don Mathre as well as many members of all College of Agriculture Departments to go to for advice.

Some people throw a few dead needles or leaves in a bag with a scribbled "Why is this tree dying?" note and fully expect that we will be able to construct the whole dinosaur from just one tooth. Others write out pages about the crop or plant history and include video tapes or digital photos. There is a story behind every sample and although I have forgotten many, some still stand out clearly. There have been many cases of crop fields dying suddenly and long dialogues with growers and county agents, field visits and lab tests resulting in complex diagnoses of disease, chemical, field history, and weather interactions. There was the prisoner incarcerated in Michigan who had read everything he could find in the prison library, but still couldn't find out why the tomatoes in the prison garden kept dying. There was also the lady from Coffee Creek who was so happy that her petunias were dying from Fusarium wilt and she only had to switch to another [illegible] of flower to have blooms outside her window again. [illegible] we have diagnosed pine wilt nematode of Scots pine, brown root rot on alfalfa, and bacterial vascular necrosis on sugarbeet as well as several other diseases that have never been reported in Montana before.

About 28% of our samples come from farms, ranches, greenhouses, nurseries and golf courses. These are the economically important ones and a correct diagnosis of the problem is often crucial to the life of those operations. The other 78% of the samples are yard and garden samples such as trees, vegetables, flowers and houseplants. Although people's livelihoods are generally not at stake with these samples, the plants in these groups are very diverse so this keeps me on my toes as to the common problems on serviceberry, kohlrabi, raspberry, and Alberta dwarf spruce in different areas of Montana.

Additionally, we operate a toll-free Horticulture Hotline with Bob Gough and test pulse crop seeds for diseases in conjunction with Neal Foster and the Seed Lab. The Hotline started as a way of easing the number of horticulture calls that Bob Gough and the county Extension agents were receiving. It makes my summer work hours longer, but it is so invigorating to be asked how to grow grapes and what do woodchucks eat - instead of only "Why is my spruce tree dying?" And if you visit the Disease Clinic this summer, you will notice that Cheryl Peterson, a recent Horticulture graduate will be here a few days a week to answer Hotline calls too!

Montina, a New Gluten Free Flour
by Tim Anderson

Dr. David Sands, Dr. Alice Pilgeram and Tim Anderson of the Plant Science Department at Montana State University have been evaluating the potential of producing gluten free flour from *Achnatherum hymenoides,* a perennial bunchgrass native to the Western United States. *Achnatherum hymenoides,* has several common

names including sand bunchgrass, Indian millet, Indian ricegrass and Arrocillo. This gluten free product will be marketed under the trade name 'Montina'. It was a staple the Native American diet for centuries prior to the introduction of wheat and corn. Native Americans pounded the small dark seeds into flour and made coarse bread, which was higher in nutrients than corn meal.

MSU researchers have been looking for alternate crops to supplement wheat and barley farmers who face crop prices that are lower than before World War II. One aspect of this search was to explore and develop the potential of perennial crops. This list of perennials included Indian ricegrass, which is widely used as a reclamation species for roadside, mining and conservation uses, but hadn't been ground into flour for many years.

Initial efforts at making bread with the Indian rice grass flour resulted in extremely dense pumpernickel type bread. The density of the bread indicated that the gluten levels were very low, a fact supported by later gluten testing. The gluten testing was conducted by Medical Innovations Limited of Artamon, Australia using their AOAC approved Gluten Laboratory ELISA Test Kit. Medical Innovations developed this gluten test and are an industry leader in gluten testing. The results of the ELISA tests are compared against samples that contain various levels of gluten, including products that are considered gluten free. These gluten free products contain less than 0.016% gluten, which is the lowest detectable level of gluten. Our Montina samples have been determined to have less gluten than these gluten free controls and are therefore considered to be gluten free. I have clarified these results with groups like the Gluten Intolerance Group in Seattle and the Celiac Sprue Association, who confirmed that these results indicate that Montina is gluten free.

A Montina baking contest was conducted to determine the response to this unique dark flour. The response was extremely positive, drawing 68 entrants from across Montana. Each entrant was given five pounds of flour and a small portion of xanthan gum with which to work. The entries were divided into ten categories, ranging from breads to cookies to tortillas and judged by a blind panel for flavor, texture, and appearance. The results were tabulated and combined into the 'Montina' cookbook. Some truly delicious recipes were entered, with the people accustomed to gluten-free cooking preparing the majority of the prize-winning dishes.

Southern Testing and Research Laboratories conducted a nutritional analysis of Montina and the nutrient profile indicates a higher protein and fat content than other grains currently used in the gluten-free diet. Look for the complete cookbook, gluten testing and nutrient profile on the www.montina.com website, which is currently under construction.

A group of interested growers in Montana are forming a cooperative to grow, mill and package the Montina flour. Growers currently have about 100 acres of IRG in production and plan to seed several hundred more acres this fall. A designated gluten-free mill has been established and Montina flour will be available for further baking trials. We are optimistic that by this time next year 'Montina' will be available on a limited commercial basis.

Thank you for your interest and for any further information regarding 'Montina' contact Tim Anderson at Montana State University via phone 406-994-1986 or email uplta@montana.edu.

Growing Tips by Bob Gough

Unwanted fruit can be removed from your trees by hand, by other mechanical means such as by beating them off with a hose-ended stick, or by treating them with growth regulators. Many of these sprays act in a manner similar to hormones, or act to disrupt the natural hormonal components and processes of the plants involved in fruit set and retention. For example, NAA temporarily inhibits abscission of young fruit by augmenting the amount of endogenous auxin present. It subsequently causes injury that impedes the transport of auxins and other hormones from the young fruit to their abscission zones. With lower auxin concentrations present, the separation layer forms and the fruit aborts. NAA also acts to abort fruit by stimulating endogenous ethylene production. Ethephon directly raises the concentration of ethylene, causing abortion.

The efficacy of any growth regulator spray depends upon timing and concentration, as well as weather conditions. Additionally, different species and cultivars react differently to different concentrations– what works for 'Cortland' apples may not necessarily work as well for 'McIntosh'. Cottonwood does not appear on the following list. To my knowledge, there is no spray available that will abort the female flowers of cottonwood. Growth regulator treatment is quick and easy but effectiveness is highly dependent upon weather, the compound, the concentration, the stage of growth of the plant, and of course, the species. Not all growth regulators work on all species under all conditions.

If you are considering using a growth regulator to abort unwanted fruit, ALWAYS consult your county agricultural agent and the compound label BEFORE you spray. The wing information should be considered a GUIDE ONLY.

Chemical methods to abort fruit. Effective concentrations and their time of application are given for each species.

Crop	Naphthalene Acetic Acid (NAA) Trade Names: App-L-Set, Sta-Fast, Stix, Olive-Stop	Naphthalene Acetamide (NAAm) Trade Names: Amid-Thin	Ethephon Trade Names: Florel	Sevin 50 %
Apple, eating (*Malus domestica*)	40-60 ppm	50 ppm	750 - 1000 ppm	1 lb / 100 gal; 20 - 35 days after full bloom. This compound is very toxic to bees.
Crabapple (*Malus* spp.)	20 ppm; full bloom + 15 days		1000 ppm	
Pear, eating (*Pyrus communis)*	Follow Label		Flower bud to full bloom	
Pear, ornamental (*Pyrus calleryana*)			1000-2000 ppm; full bloom	
alpa spp.	60 ppm; full bloom			
m (*Ulmus* spp.)	40 ppm; full bloom			
Honeylocust (*Gleditsia tricanthos*)	When fruit are 2-5 cm dia.			
Horsechesnut (*Aesculus hippocastanum*)	Full bloom			
Maple, including Box elder (*Acer* spp.)	40 ppm; full bloom			

Always consult the label directions and your local county ag agent for the latest information on concentrations and timing. Things change fast in the field of growth regulators.

Where did dandelions come from and how do I get rid of them in my lawn?

The dandelion plant has been cultivated since prehistoric times. The Romans ate it, Anglo-Saxon tribes ate it to control scurvy and it was grown as a medicinal plant in monasteries. a rare plant, in that all parts can be eaten. The raw leaves e a great salad and the cooked leaves are a substitute for spinach and other potherbs. The roots can be eaten roasted or fried. The blossoms, dipped in batter and fried, make a tasty treat that, unfortunately, will turn your tongue yellow for some time. And of course, wine made from the flowers is always a delight.

The Puritans introduced the plant into the American colonies as a potherb in the 1630's and it has spread all over the place since then. It is high in iron, copper, potassium and other nutrients, and it contains more than twice the phosphorus of cabbage. In 1942, the U.S. imported 100,000 pounds per year of dandelion root at a nickel a pound for medicinal and diuretic use.

So how do you get it out of the garden and lawn? It is very difficult. Some broad-leaved herbicides do a good job, but be careful not to get them near your shrubs or gardens. If you want to dig them out, good luck. Since dandelions will re-sprout from a broken taproot (which, by the way, is quite long and tough) you'll have to dig out the entire root to slow the plant down.

BOB'S BYTE by Bob Johnston

If you send attachments via email, be aware that anyone can read them. If you need some level of security, you can use WinZip to do a simple encryption of your file. You will however need to come up with some way to supply the recipient of the message the password before the message is sent. You could do this in a separate email.

The following instructions are from the WinZip help file on setting passwords.

WinZip® uses the industry standard Zip 2.0 encryption format. Password protecting files in a Zip file provides a measure of protection against casual users who don't have the password and are trying to determine the contents of your files.

The main WinZip window lists password protected files with a plus sign following the filename.

If you use the Extract, Test, Check Out, or Install features on a password protected archive, you will automatically be prompted for the password.

Using password security while adding or updating an archive:

To password protect files, it is important to specify the password AFTER opening or creating an archive and BEFORE adding the files.

Follow these steps to password protect files in an archive:

1. Open or create an archive. If you are using the New dialog box, uncheck the Add Dialog checkbox at the

right of the dialog box. The archive is the name of the file after it is compressed. Ie myfile.doc à myfile.zip

2. In the Add dialog box, click the Password button, and type a password.

Notes:
In addition to the methods specified above, you can choose Password from the Options menu to specify a password.

Use the Mask Password checkbox to control whether the password is hidden while typed. If you check this option, you will have to re-type the password for confirmation (to avoid typographical errors).

Passwords are cleared (reset so that no password is in effect) when an archive is closed or another archive is opened.

Be sure to remember any passwords you use, so that you can extract your files!

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Employee of the Month - Deb Habernicht, Cereal Quality Lab

Deb grew up on a small family farm in Jerome, a town with one stoplight in Southeastern Idaho. Every Saturday, she went to the cattle sale with Grandpa where she had to sit on her hands when the goats come through because Grandpa was afraid she would bid on one. Her Dad didn't trust horses – so she broke young calves to ride and eventually inherited a donkey. Finally, Deb bought herself a Honda 90 three-wheeler that she named appropriately "Red Lightning." Dad taught Deb and her brother finances in the real world. They worked on the farm all summer without wages. Instead, they got free feed for the calf they had bought in the spring and would sell in the fall. The profit was their summer wage.

Deb earned her B.S. in Biology at Idaho State University, Pocatello. Within a year, the small-town girl moved to the metropolitan area of Portland, OR after securing a job with Great Western Malting. She worked as a lab tech in the quality control department before moving into research and development. Deb moved to Bozeman four years later to work on barley quality with Tom Blake and Jan Bowman. Just before pursuing a master's degree in Agronomy under Tom, Deb married her best friend Jim. took a crash course in wheat quality and in July 1997 came on d the Cereal Quality Lab as lab manager where she was able to apply all the quality control skills she learned while working in the brewing industry. She is grateful to be working along side people who have such a strong work ethic and take pride in developing the best wheats in the world.

Outside the CQL, Deb enjoys having lunch with friends, making an effort to exercise, working in her yard and trying to make things grow in her garden, trying new recipes, reading while hanging out with her golden retrievers and Chester the cat, and backpacking. Most of all, she loves laughing with her husband and giving heartfelt worship to the Lord.

R&C Awards
The following faculty received awards from the Research and Commercialization Board: Dave Sands, Luther Talbert/Bob Sharrock, Tom Blake, and Mark Young. The R&C Board was newly created 1 year ago. It took the place of the MSTA-Montana Science and Technology Alliance.

Scholarship Recipients in PSPP Department, 2001-2002

Annin Foundation	Monique Haufle Stephanie Kienitz
Campbell Family Found. Schol.	Jessica Hendryx Andrew Humphrey Leah Jarrett John Meyer Liam Murphy Akasha Reiner
College of Agriculture General	Samuel Anderson Katie Dugger Bobbi Heikkila Michele Mettler
Gene Donaldson Memorial	Lyndsie Jensen
Clyde & Helen Erskine Fund for Excellence in Education	Andrew Humphrey Andria Huntsinger Sarkis Michail
Robert F. Eslick Memorial Grad Award	Fletcher Meyer
Charles F. Gumprecht Agriculture Schol.	Darek Axtman Ana Pederson
Frank M. Harrington Memorial	Shara Dame Liam Murphy
Huffman Improvement Award	Kendra Coloff Seth Swanson
Samuel C. & Hazel West Litzenberger	Brian Abbott Justin Overcast Doug Weist
Montana Seed Growers Asso. Scholarship	Brian Abbott
Dr. Arthur H. & Margaret C. Post Schol.	Charles Marks

James & Margie Robertson Mem. Fund	Katie Shampeny Kate Spizziri
John & Grace Schutter Ag. Merit Schol.	Jason Cook Rob Schlothauer
Bayard L. Taylor Scholarship	Kristi DeVries Andria Huntsinger Leah Jarrett Sarah Klingsporn Charles Marks Rob Schlothauer Katie Shampeny

Congratulations!

Osmundsun Wins Award

Todd Osmundson has been awarded an MSA Mentor Travel Award to the 2001 Meeting in Salt Lake City of the Micological Society of America/American Phytopathological Society. To win this award, he send them a copy of his abstract for the poster he is presenting, a cv, and a letter of recommendation. The Department is matching the award amount.

w Employees

Tracy Dougher - Professor of Horticulture - 312 LJH

Tracy grew up in Mt. Pulaski, Illinois, the oldest of 9 children. Because her family depended heavily on their garden, she spent much of her youth weeding. She pursued a degree in Mathematics with a Computer Science minor from Southern Illinois University but realizing she missed the outdoors, gardening, and sunshine, she obtained an M.S. in Horticulture from Purdue University and a Ph.D. in Plant Science from Utah State University. Both of her programs were part of a NASA program exploring plant growth in controlled environments for eventual deployment in outer space. Her areas of research interest are in light quality effects on plant growth and plant recovery from abiotic stress.

Tracy's husband, Frank, is a Geographic Information Systems Specialist (currently seeking employment). They have two very active children, Frankie, 5, and Alessandra, 2. en conditions are favorable, Tracy enjoys playing sports, wboarding, sewing, gardening, and playing the banjo.

Xeuyen Shan (Chen) - Graduate Student - 124 ABS

I was born in Yantai, a middle-size city on the eastern coast of mainland China, in Shandong Province. My hometown has a mild climate and is famous for apples, cherries, seafood and brand beer production. After I got my B.S. in the Department of Biology in Shandong University, I studied in Beijing and received my M.S. from the Institute of Genetics, Chinese Academy of Sciences, which is one of the top research institutes in China. I am proud of having been a graduate of the Chinese Academy of Sciences. Afterwards, I worked in Beijing for a few years and then came to the States as a Ph.D. student in Montana State University. I worked on the identification and cloning of chromosome specific AFLP markers in wheat and barley with Dr. Luther Talbert and graduated two years ago. I went on to Oregon State University as a postdoc and worked on cloning of cytokinin glucosyltransferase genes in beans. Currently, I am a postdoc with Dr. Mike Giroux, working on genes encoding enzymes of starch biosynthesis pathways. I enjoy working and living here very much. I am interested in learning more from friends, for example, sharing recipes. Thanks!

John Terry - Seed Lab - 710 LJH

My name is John Terry. I am a new employee in the Seed Lab. I am a 1999 graduate of Montana State University-Bozeman. I have a Bachelor's in Biotechnology with an emphasis in Microbiology. I just relocated to Bozeman from Billings. With me I bring my wife and 11 month old son. We like the area and plan on staying here. In previous occupations, I have worked in a warehouse for Associated Food Stores and have held several work study jobs in various labs on campus when I was a student. I am very happy to be back in the Bozeman area and look forward to working here.

Tawnya Morgan - Seed Lab - 710 LJH

I am a Montana native. I grew up in Kalispell and then moved to Bozeman in 1993 to attend MSU. In 1998, I graduated from MSU with a B.S. in Animal Science-Feed/Health Option. I married Brad Morgan and we moved to Billings where I worked in the office of the Leachman Cattle Company. Our little girl, Mariah Allie, was born in November. In January, we packed up our things and
moved back to Bozeman, this time to stay! I enjoy

riding/showing horses, fly fishing, hiking, mountain biking, shooting my bow and spending time with my family.

Podium in 108

podium in 108 originally came from the library. Gary el spent several hours sanding and staining it. His wife Susan did the painting on the front. Thank you Gary and Susan for giving us an attractive podium!

Goosey Wins Scholarship

Lynn Goosey (Dr. Sharrock's lab) has been awarded $8,000 from PEO, a women's philanthropic group. The PEO Sisterhood was founded in 1869 on the campus of Iowa Wesleyan College in Mount Pleasant, Iowa. They award scholarships to American women in the last 1 to 2 years of their graduate studies. To apply, Lynn filled out and extensive application and had a personal interview. She plans to use the money to work in another lab, here or abroad, with the goal of expanding her experience in molecular genetics to an area outside of arabidopsis. Congratulations Lynn!

g receives Doctorate

pun (Tong) Worapong successfully defended her doctoral thesis on April 30. The title of her thesis was, "Taxonomy, Molecular Phlogeny, and Taxol Production in Selected Genera of Endophytic Fungi". She will be here for a few more weeks and then she will be heading back to Thailand to teach at Mahidol University and do fungal research. Congratulations Tong-we will miss you!

Manuscript Accepted

Bob Sharrock and Lynn Goosey recently had a manuscript accepted for publication in the Plant Journal. The title of the manuscript is "The Arabidopsis *compact inflorescence* genes: phase–specific growth regulation and the determination of inflorescence architecture".

Grants

Barry Jacobsen, Development of Biointensive Strategies for Sugar Beet IPM, Western Region IPM Program.

Mark Young, Viral Based Architectures, DEPSCoR.

The following have received Montana Wheat & Barley Grants: m Blake, Phil Bruckner, Andreas Fischer, Michael Giroux, Habernicht, Luther Talbert, Jack Martin, Jack Riesselman, and John Sherwood.

Recipe of the Month

2 cups cooked pasta-penne or fuscili About 4 chicken breasts

1 head garlic-sliced thin or chopped fine (less if that amount scares you)
1 large yellow or red onion-julienne
1 red bell pepper-julienne
1 green bell pepper-julienne
1 bunch fresh basil or 1 t dry basil
1 orange-juiced
1 cup marinated artichoke hearts
1 lime-juiced
2 oz olive oil
1 cucumber-diced or julienne
(Add any other veggie that you like)
1 t sugar
Salt and pepper to taste

Combine the orange juice, lime juice, soy sauce, olive oil, balsamic vinegar, black pepper , salt , sugar, basil, and half of the garlic. This is the marinade. Place the chicken breasts in the marinade for at least 1 hr if possible, but if not, then for as long as you can.

Combine the peppers, artichoke hearts, onions, cucumbers the other half of the garlic, and any other veggies that you like. Add a pinch of salt and pepper, or your favorite. spice.

Grill the chicken, saving the marinade. Cool the chicken for at least 15 minutes, then slice it . Combine the vegetables, cooked pasta and chicken with the leftover marinade. Toss a couple time to coat. Also, you can always add some of your favorite Italian dressing to give it an extra boost of flavor. The oil from the marinated artichoke hearts also works great. Enjoy.

May Birthdays

Johnston, Mareike	22
Blake, Tom	24
Ford, Gene	29
Johnston, Bob	29
Nash, Deanna	31

Happy Birthday!

Poetry by David Sands

The robin waits,
Head cocked,
Ready for the earthworm.
That lowly morsel,
Hardly the thing

Of which dreams are made.
Earthworn,
Itself dreams of freedom,
Fresh air,

On the Personal Side:

Christina Rose Riesselman, daughter of Jack and Marcia Riesselman was recently honored as a Chancellor Scholar at the All-University Honors Convocation at the University of Nebraska-Lincoln. These students have earned A's on all of their graded course work. Christina will be receiving her degree this May with a bachelor of arts in English and a second major in Geology. She has been employed by Phil Bruckner and Jim Berg for the last 3 summers doing field work. Congratulations to Christina on receiving this prestigious award!

Jane Jessell (7039) is searching for a furnished house for the summer for an elderly visiting professor and his wife for the summer. It needs to be close to campus.

Tracy Dougher is turning one billion seconds on May 10. My husband is looking for a GIS job.

Matthew Meyer recently became engaged to Julia Czywczynski. Julia is pursing a career as a physician's assistant. They will probably not be tying the knot for 2 more years due to their individual scholarly pursuits.

This picture and the one on the front page were taken by Irene Decker at a Tulip farm near Woodburn, Oregon the middle of April.