

Plant Science Says

Volume 14, No. 2

March, 2011



Gluten-free, A Value-added Montana Industry by Alice Pilgeram



Celiac disease or gluten intolerance is a genetic disorder that affects nearly 1% of the US population. In these individuals, consumption of even minute amounts

of gluten damages the small intestine and interferes with absorption of nutrients from food. The symptoms of celiac disease are diverse ranging from intestinal problems (abdominal pain, bloating, gas, and diarrhea) to dermatitis to neurological disorders including certain forms of autism and ADD. The only treatment for celiac disease is avoidance of gluten which includes any food that contains wheat, barley or rye. Another 9% of the US population is gluten sensitive, and they find that they do better if they avoid gluten.

Diagnosis of celiac disease and associated disorders has rapidly increased in the US over the past decade most likely increased awareness and improved diagnostic tools. Resultantly, there has been a huge increase in gluten-free products specifically aimed at the gluten-free consumer. Unfortunately, this industry is not well regulated and a glu-



Alice Sands and Rich Hohne trying one of the earlier gluten free products

ten-free label does not necessarily guarantee that a product is gluten free. In addition, most gluten-free products simply do not taste very good.

Dave Sands started working with gluten-free crops about 20 years ago. Many of you will remember the multitude of unpleasant breads and products that we forced you to sample. Fortunately, we have come a long way!!!



The first gluten-free grain that was developed out of MSU was Indian ricegrass (IRG). Indian ricegrass is native to the

Great Plains and ranges from New Mexico to Edmonton, Alberta. There is archeological evidence that this grain was collected by Native Americans and consumed as a condiment or when game was in short supply. Dave ground IRG into coarse flour and challenged everyone in the lab to bake with it. The results were dismal. Nothing that we made was edible. However, as it turns out, IRG flour is gluten-free. Thus, we reached out to Bettie Stanislao, an MSU food scientist, and the Celiac Community. They worked with the IRG flour and were able to develop a number of products that were not only gluten-free but also very tasty. IRG flour is produced in a gluten-free facility run



Indian rice grass

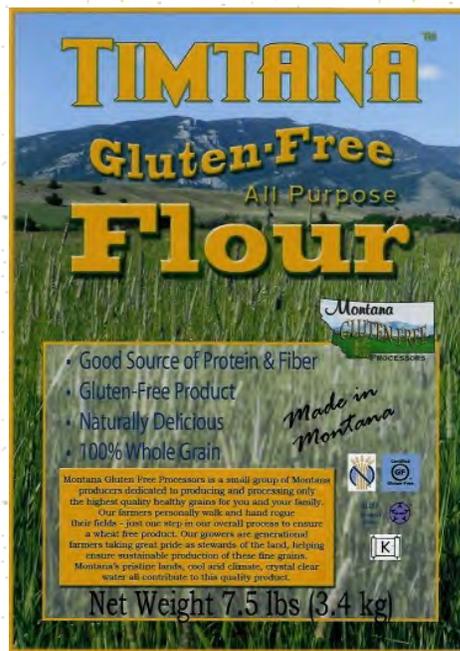
by Amazing Grains LLC in Pablo, Montana and marketed under the brand name, Montana

(www.amazinggrains.com) . Montina pure baking supplement, all-purpose flour and Montina brown rice flour blend have been commercially available since 2003. Locally they can be found at Montana Harvest on Willson, and also at Amazon.com.

The search for value-added gluten free crops continued. Dave worked directly with Montana Gluten-free Processors to produce and commercialize gluten-free oatmeal and oat flour (www.montanaglutentree.com). Oats are actually gluten-free. In the US, they are generally processed in wheat facilities and are subsequently cross contaminated. Montana Gluten-free Processors established a gluten-free processing facility in Belgrade, Montana in 2008. This facility is unique in that all grain shipments are analyzed for gluten prior to entering the facility. Contaminated oats never make it through the door. Montana gluten-free oats are unique in that they contain a very high content of protein (18-20%). The oat products (PrOatina™) are produced in Montana, processed in Belgrade and marketed through the United States (again available at Montana Naturals). This facility is certified gluten-free and kosher.



Montana's most recent gluten-free crop is Timothy. Our rationales for looking at this crop were that horses love Timothy and farmers often chew on Timothy blades. Our discovery that it was gluten-free was simply icing on the cake. Timothy flour is the best gluten-free flour on the market. It can easily substitute for wheat in most recipes. Timothy breads and cookies taste great. Timothy flour is processed and mar-



keted by Montana Gluten-free Processors. Recently, they introduced a series of gluten-free bread mixes that contain both Timothy and oat flour. Mixes for lemon bars and pumpkin cookies are in development.

Montana Economy

Gluten-free crops and products are value added. Importantly, as the crops are processed from raw grain to finished flour, they are much more profitable than commodity wheat production. In addition, processing and marketing create Montana jobs. No single gluten-free crop will ever displace wheat production across Montana. However, they greatly increase the profitability of individual farms.

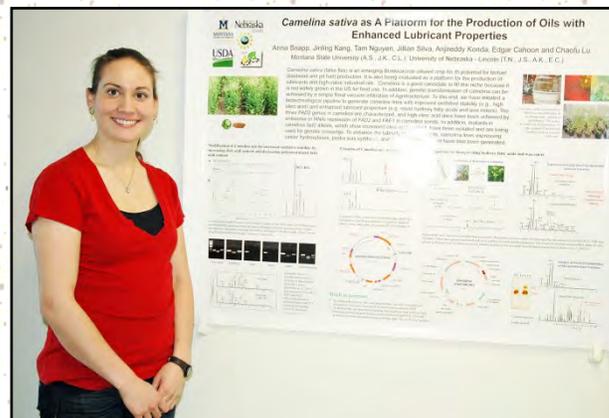
Despite our reputation as a wheat-producing state, we have quietly gained a reputation as a gluten-free producing state. We currently have three certified gluten-free processing facilities in the state. They are not only processing Montana products, they are processing and packaging gluten-free products from neighboring states. Given our successes with Indian ricegrass, PrOatina oats, and Timtana, the gluten-free industry in Montana will continue to grow benefiting producers and processors across the state.

Camelina Research Presented at the Gordon Research Conference By Anna Snapp

From Jan 31 - Feb 4, Chaofu Lu and I travelled down to Galveston, Texas for the Gordon Research Conference [GRS is for graduate students and postdocs] on Plant

Lipids: Structure, Metabolism, and Function. The Gordon Conference topics cover frontier research in the biological, chemical, and physical sciences, and their related technologies. This year was the second meeting for plant lipids. About 130 attendees were present from all over the United States as well as foreign countries such as China, Japan, France, and the UK. The presented research at the conference is "off-record" to encourage the sharing of unpublished results and ideas, of which there was a wide diversity. We sat in on fifty seminar presentations on just about every area of research concerning lipids including: Lipid adaptation in response to changing environment or stresses including their use in systemic acquired resistance, lipid roles in plasma and endomembrane structure/function, biogenesis of organelles and lipid trafficking, lipid roles in plant development, homeostasis, and regulation, and finally lipid and fatty acid uses for human health or industry. Needless to say, the talks impressed upon me the importance of lipids. I was also amazed at how broad the lipid field of study is. The talks I found most interesting dealt with trying to develop an algal platform for the creation of biofuels that could also be used to clean wastewater, and a talk from a group that is developing a high throughput real-time bioluminescence monitoring system to identify novel seed oil synthesis mutants. Chaofu and I were some of the only ones present working with Camelina, but we sparked a lot of interest in our research. Chaofu gave a seminar on "**Camelina sativa** as a platform for the production of biofuels and lubricants" which made for a nice introduction to my poster presentation that evening about my ongoing project to create novel oils and wax esters in Camelina seeds. My project involves inserting hydroxylases, wax synthase, and elongase genes from three different sources into Camelina via agrobacterium mediated infiltration. The incorporation of these genes will result in the production of novel hydroxy wax esters in Camelina seeds that can be used for a superior bio-lubricant. I will be presenting my PSPP seminar on my work on

April 19 for the PSPP seminar if you would like to learn more.



My research poster that is now hanging in the hall outside the Lu lab.

Montana Seed Growers Meeting By Heather Rimel

On January 22 and 23 the annual Board of Directors meeting of the Montana Seed Growers Association met in Bozeman.

Next year will be the Association's hundred year anniversary. The Board is comprised of a grower/member from six of the Ag Experiment Stations and ex-officio Dr. John Sherwood of the MSU Plant Sciences and Plant Pathology department. Board members this year are Patrick Lake (Vice President) of Ronan, Lloyd Harris of Bozeman, John Wold of Laurel, Steve Grove of Moccasin, Bob Hodgskiss (President) of Choteau and Charlie Cahill of Scobey. Also present at the meeting were Ron Larson, Tawnya Morgan, and Heather Rimel of the Montana Seed Growers, Dr. Bill Grey, PSPP, Bernie Schaff, Post Farm, Dr.



John Sherwood, Steve Grove, John Wold, Lloyd Harris, Charlie Cahill, Pat Lake and Bob Hodgskiss.

Phil Bruckner, PSPP; Dave Wichman, CARC; Ramey Lunceford, FFA; JonCee Kelley, Department of Agriculture; Clark Schmidt, BASF and our guest President Cruzado. This year honorary membership went to Leon Welty from Northwestern Ag Research Center and Gregg Carlson from Northern Ag Research Center. Each year the board reviews and carefully selects individuals who have been important to the Certified Seed industry. Special recognition went to long time past board members Jim Kulish of Stanford and Bear Whitmer of Bloomfield. A few of the hot and **ongoing topics discussed at this year's** meeting were roundup ready alfalfa and how it will be managed and inspected, Clearfield gene technology requirements from BASF, and State Seed Lab legislation. Updates were given by Phil Bruckner on new winter wheat lines, JonCee Kelley on DOA sampling, Bill Grey on Foundation Seed, John Sherwood on PSPP, and Clark Schmidt on BASF seed production guidelines for wheat and lentils. Other topics up for discussion were crop history on small grains, Chicago Climate Exchange, Farmers Yield Initiative and Gallatin Valley Farm Fair. President Cruzado joined us for lunch on Wednesday, presented her thoughts on MSU and its Land Grant mission, and asked for comments and questions from the board on what was important to them. One other final and important bit of business is the Boards support of youth in agriculture which they once again showed by making a \$500 dollar donation to the Montana FFA Foundation to help sponsor the upcoming State Agronomy Contest in Billings. If you have questions or inquiries regarding the items discussed, please contact the Montana Seed Growers Association.

Montana Ag Live! Spring Schedule

March 27—Perry Miller, MSU Cropping System's Professor, "Profitable Cash Crops for Montana Agriculture"

April 3—Nancy Schweitzer, First Lady of Montana, "First Lady Nancy Schweitzer's Classroom Garden: Discover the wonders of science as First Lady Nancy Schweitzer

shares the newest feature of the Governor and First Lady's Math & Science Initiative."

April 10—Dr. Glenn Duff, Animal nutritionist and Department Head of Animal and Range Sciences, "My vision of the Animal and Range Science Dept and our new facilities". He will also field questions relative to animal nutrition.

April 17—Charles Holt, Director of the Townes Harvest Garden, MSU, "Educating Community Food Systems and MSU's new outdoor classroom, an exciting new classroom activity offered by the Land Resources and Environmental Sciences Department."

The Prestigious ASHS Collegiate Scholars Award

By Tracy Dougher

The MSU Horticulture Faculty has named their American Society of Horticultural Sciences (ASHS) Collegiate Scholars and Outstanding Undergraduate Student Award for 2010-2011.

The prestigious ASHS Collegiate Scholars Award honors the top juniors and seniors in horticulture from all over the United States. This year's MSU nominees are:

Taven Anderson
Kyle Begger
Luke Bromley
William Chandler
Bethany Flikkema
Agatha Frisby
Erin Gunnink
Yana Neely
Cassandra Peters
Jodi Redfield

The ASHS Outstanding Undergraduate Horticulture Student Award, recognizes an elite group of students from across the U.S. for their academic, leadership, and service achievements. This year's MSU recipient is Jodi Redfield. Jodi is a senior in landscape design from Billings, MT. In her three years at MSU, Jodi has been involved in the Horticulture Club and the plant and service projects that entails.



She readily helps her peers and community by volunteering as a floral judge for the State FFA competition, participating in student interview panels for faculty and

assistant dean hires, and assistant teaching in two plant identification courses. Jodi has already proven herself capable and passionate about her work. She has acquired her Integrated Pest Management Certification and, more notably, passed the Montana Nursery and Landscape Association (MNLA) Certified Plant Professional exams. She is a Montana University System Honors Scholar and MNLA scholarship recipient.

Recipients of both these awards will receive a certificate from ASHS and their names will appear in the April issue of the *ASHS newsletter*.

Course Focus **Vegetable Production — PSPP 337** **By Cheryl Moore Gough**

PSPP 337 – Vegetable Production

Vegetable Production is again being offered by the Department of Plant Sciences and Plant Pathology this fall semester. Vegetable Production is offered alternate fall semesters and will not be taught again until fall 2013. There is no formal lab with the course, but I do hope to have vegetable plants for class observation and discussion.

We will discuss vegetable classification systems, soils appropriate for vegetable production, and watering methods and cultivar selection, as well as breeding and improvement and pest management. There will be a detailed discussion of all vegetable growth requirements.

Each student will be required to prepare and present a one-half hour presentation on a vegetable of his/her choice. Students

will formulate their presentations from a perspective of their choice - professional vegetable production or seed saving production to help ensure genetic diversity. The final includes a take-home project requiring students to plan and map a 1,000 sq. ft. vegetable garden to utilize methods and principles learned during the semester for proper plant placement, spacing and cultural requirements.

This course is designed to take students beyond simple vegetable gardening, which is fraught with misinformation, and into the understanding and application of scientific principles to vegetable culture.

I am available to answer any of your questions – cheryl@montana.edu.

Hazardous Waste Pickup

Safety and Risk Management announces a new online form for requesting hazardous waste pickup. The form will be used for all forms of hazardous material pickup, including radioactive, chemical and bio-waste. In addition, the form can be used to request battery pick-ups, chemical waste containers or bio-waste/sharps containers.

The form should be used immediately in lieu of phone and e-mail requests to Safety and Risk Management personnel. To find the form, visit <https://www.montana.edu/wwwsrm/forms/waste/>.

For more information, contact Shannon Scanson at 994-7760.

Grants

Mary Burrows, "Reducing pesticide use by expanding the educational mission of the MSU Urban IPM Program", USEPA.

Mary Burrows, "Efficacy of fungicide seed treatments", North Dakota State University.

Cathy Cripps, "Inoculation of Whitebark Pine with Mycorrhizal Fungi," USDA Forest

Service, Whitebark Pine Foundation.

Mike Giroux, "Improving Rice Photosynthesis and Yield", Consortium for Plant Biotechnology Research.

Kevin Wanner, "Insect Pest and Extension Pulse Crops", Northern Pulse Growers Association.

Publications

Jinling Kang, Anna R. Snapp, Chaofu Lu, Identification of three genes encoding microsomal oleate desaturases (FAD2) from the oilseed crop *Camelina sativa*. *Plant Physiology and Biochemistry*, 49 (2011) 223-229.

Cripps, C., and J. Ammirati (Editors), 2010. Arctic-Alpine Mycology 8 [Eighth International Symposium on AA Mycology, Beartooth Plateau, Rocky Mountains, USA 2008]. *North American Fungi* 5(5): 1-220. Also online at:

http://www.pnwfungi.org/articles_volume_5_ISAM.htm

Chapters include:

Cripps, C.L., and J. Ammirati, Editors. 2010. Eighth International Symposium on Arctic-Alpine Mycology (ISAM 8), Bear-

tooth Plateau, Rocky Mountains, USA 2008. *North American Fungi* 5(5): 1-8.

Cripps, C.L., E. Larsson, and E. Horak. 2010. Subgenus *Mallocybe* (*Inocybe*) in the Rocky Mountain alpine zone with molecular reference to European arctic-alpine material. *North American Fungi* 5(5): 97-126.

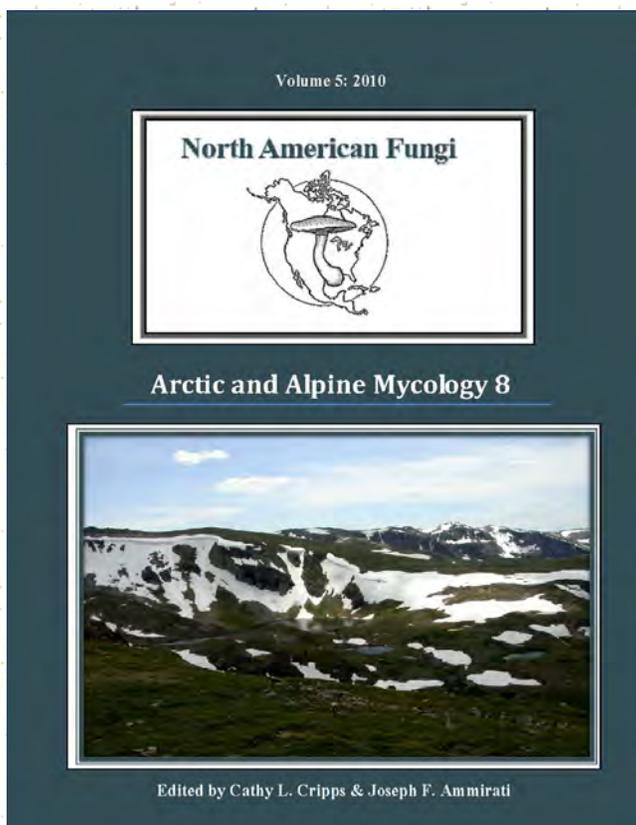
Cripps, C.L., and E. Horak. 2010. *Amanita* in the Rocky Mountain alpine zone, USA: New records for *A. nivalis* and *A. groenlandica*. *North American Fungi* 5(4): 9-21.

George, C.M., A.N. Shams, and F.V. Dunkel. 2011. Lessons learned in creating an expansive collaborative to address bottom-up development. *North American College Teachers Agriculture Journal*. In press.

Northwest Flower and Garden Show By Toby Day

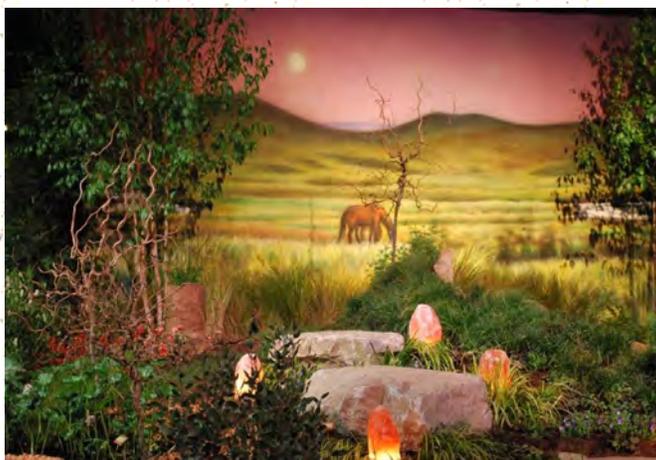
Master Gardeners from all over the state attended the Northwest Flower and Garden Show in Seattle, Washington, February 24-27. The Northwest Flower and Garden Show is the third largest of its kind in the world. The show consisted of over six acres of garden displays, nearly 350 vendors at the Gardening Marketplace, a garden resource center, a PlayGarden for the kids and over 120 world class seminars.

The theme of the show, "Once Upon a Time..." was prevalent throughout the show with 24 masterfully produced theme gardens from local landscape artists and companies. The gardens were also spot-



Seminar on growing food in your front yard

lights for garden material that could be grown in the Northwest. To get the plants to leaf out and flower at the time of the



These three photos are three of the 24 theme gardens



Japanese theme garden

show, they went to great lengths using a new greenhouse and a “coaxing” program. Windmill Gardens, the nursery in charge of the “coaxing” program oversaw more that 7,000 plants prior to the show. They all had to be timed perfectly and shipped properly so that the plant material was at

its best when the show began — no easy task when the temperatures before and during the show were one of the coldest on record for the year.

The owner of the show, Terry O’Laughlin of O’Laughlin Trade Shows is the third generation to keep this and other shows going. In a private dinner to which I was invited, I overheard him say that over 80,000 attend the show each year. A brilliant staff, hard work and patience really showed this year. The judges of the show, who included Panayoti Kelaidis, senior curator for the Denver Botanical Gardens, also gave seminars during the show. There were many other great talents giving presentations and demonstrations including Graham Kerr, the former Galloping Gourmet to Ed Hume, popular author and owner of Hume Seeds.

There were 40 Master Gardener volunteers who signed up for the trip that included a crazy bus ride through three winter passes to Seattle, a three nights stay at the Crown Plaza and tickets to the show. Everybody had a great time and learned a great deal from the experience. In the survey the Master Gardeners all agreed that the trip enhanced their Master Gardener experience and that they would do it again next year. So, looking forward to next **year...I think the bus is going to fill up fast.**



Vendors at the show

MSU Firewall Changes, In Plain English

by Matt Rognlie, College of Ag IT Coordinator



You may have heard that there will be major changes to MSU's firewall on March 23. In other words, changes in how network traffic leaves and enters the campus network.

In the past, we used to say to incoming requests: "C'mon in! Except for you, you, and ... you. And except this place and that place that no one can get to."

Now we will say: "No one gets in unless they specifically ask for particular resources in particular locations." The change is from inherently *open* to inherently *closed*.

Is this a good thing? YES! Will it affect me? YES! Will I have to do something about it? Likely, NO.

These changes affect you because now people from off campus (Bozeman, California, China, you name it) have no access to campus (including your) computers unless specifically allowed. Hopefully it's obvious that this is a huge jump in security. We've needed this change for quite some time.

This change doesn't require you to do something because at work, you will see no difference. If you are off-campus, you will still have access to the resources you use now. The **ONE** exception for most people is for those using Remote Desktop to access their work computers. **IF** you are not connecting to the MSU network using VPN *before* connecting to your computer via Remote Desktop, **THEN** you will now need to. It is a recommended security practice to do this and you should be doing it now anyway. Please see <<http://bit.ly/euPvCc>> for information on how to use VPN, provided by the MSU Information Technology Center. (VPN stands for

'Virtual Private Network'). Mac instructions are at <<http://bit.ly/hnQvTo>>.

OK, there is one more exception: If you run a Web server on campus to provide resources to visitors from off-campus, **then you'll need to register an exception for your Web server.** Please contact me for more information, although I think I've already notified everyone affected.

In summary, ITC's changes to the firewall affect anyone off-campus reaching into the campus network to retrieve information, but do not affect anyone on-campus reaching off-campus to retrieve information.

Finally, I'd like to provide a few examples of things that will, and will not, be affected.

NOT AFFECTED

- * Checking e-mail from home or anywhere off-campus using Outlook Web, or pretty much any other method.
- * Viewing MSU Web pages from anywhere, including D2L, MyInfo, and Banner.
- * Viewing non-MSU Web sites while at work.
- * Using Remote Desktop to access your work computer (as long as you're connecting to the MSU VPN first).

AFFECTED

- * Web servers on campus that provide information or services accessible from off-campus (server administrators have created exceptions for these).
- * It is no longer easy for the bad guys and/or bad software off-campus to access our computers.

Questions??

Please let me know if you have questions, by e-mail at mrognlie@montana.edu. This document applies ONLY to the College of Agriculture.

More information from ITC is at <<http://www.montana.edu/msufirewall/>>

Recipe of the Month

Brazilian Fish Stew

- 3 T lime juice
- 1 T ground cumin
- 1 T paprika
- 2 t minced garlic
- 1 t salt
- 1 t ground black pepper
- 1 1/2 lbs tilapia fillets,
cut into chunks (or cod)
- 2 T olive oil
- 2 onions, chopped
- 2 bell peppers, sliced
- 1 (16 oz) can diced tomatoes, drained
- 1 (16 oz) can coconut milk
- 1 bunch fresh cilantro, chopped (optional)



March Birthdays

Courtney Speegle	3
Dai Ito	11
Aman Anand	15
Yousef Zadegan	17
Vickie Blake	28
Elaine Nichols	31

