

If you desire peace, cultivate Justice, but also cultivate the land to produce bread—otherwise there will be no peace.

Norman Borlaug, 1970



AURORA SPOREALIS • 2009

The alumni news magazine of the Department of Plant Pathology at the University of Minnesota
Published continuously since 1924

Letter from the Editor

This issue of the *Aurora Sporealis* is special in several ways. This is the last issue that will be printed and mailed to alumni and friends of the department. In an effort to be “greener” and to reduce costs, only a limited number of copies will be printed next year. If you wish to receive a printed copy, you need to tell us either by an email to Anne Lageson (lages001@umn.edu), the new departmental Executive Secretary, or by a letter sent to Anne Lageson, 1991 Upper Buford Circle, 495 Borlaug Hall, St. Paul, MN 55108. All alumni and friends will receive a pdf copy of the *Aurora* by email. Please take a moment to make sure we have your current email address.

You can do this easily by going to:

http://plpa.cfans.umn.edu/Register_for_updates.html/. This page is available from the home page for the department at <http://plpa.cfans.umn.edu/> under Register for Updates.

With this issue, we pay tribute to the department’s most esteemed alumnus, Dr. Norman Borlaug. Over the years, many of us have had the privilege of meeting and talking with him about his work and telling him about what we were doing. At each meeting I was always struck by his sincere interest in all aspects of plant pathology research, concern for others, and humbleness of his achievements. He unfailingly recognized those that worked with him. Just think what a different, and poorer, place the world would be without the work and influence of Dr. Borlaug. Amazingly, if he had not been awarded a Research Assistantship in Plant Pathology, his great work might never have happened. Are we missing other great scientists and humanitarians because we lack the funds to support their graduate education? How would your life have changed if you had not gotten support for graduate studies?



There are several funds set up for you to be able to honor the memory of Dr. Borlaug and to support work to continue his vision for educating scientists and developing crops to feed a hungry world. The Department of Plant Pathology has established the Norman E. Borlaug Fellowship in International Agriculture. When fully endowed, the fellowship will provide a generous stipend and research funds to attract the best applicants from around the world to the Department of Plant Pathology. In accordance with Borlaug’s wishes, the Graduate Fellows must conduct their research on a small grain cereal crop (e.g. wheat, rice, barley, oat, or rye), and spend at least two growing seasons of their research and/or outreach and educational activities in an underdeveloped country before being granted their degree.

Memorial contributions may be made securely online from the department homepage (<http://plpa.cfans.umn.edu/>) under Fellowships, Scholarships, and Endowments. They may also be mailed to:

University of Minnesota Foundation, CM-3854
PO Box 70870
St. Paul, MN 55170-3854

The Norman E. Borlaug Fellowship for International Agriculture Fund No. 1445
E.C. Stakman Plant Pathology Graduate Student Fellowship Fund No. 5646
Norman Borlaug Youth Institute Scholarship Fund No. 5036.

With best wishes,

Debby Samac
Aurora Sporealis Editor-in-Chief

Letter from the Department Head

Dear Alumni, Faculty, Students, Staff, and Friends,

Welcome to the new format of the *Aurora Sporealis*!

The new format favors shorter articles and fewer printed pages. Please be sure to provide your email address to receive the newsletter electronically.

We'll mail the newsletter to our friends and colleagues who prefer a hard copy.

The *Aurora* will also be available on the department's website. You might be interested to know you can now browse past editions of the newsletter by going to the UMN Digital Conservancy site: <http://conservancy.umn.edu/handle/1294/>.

To search for specific people, places or events, go to the searchable index first at <http://purl.umn.edu/44443>. Once you've located an item of interest in the searchable index, go to the UMN Digital Conservancy site to read the article. I hope you enjoy perusing past issues; I found those from the early years of the department (pre-1950s) especially interesting and fun to read.

As you'll see in this edition, the department is thriving, even in this time of economic uncertainty. We are committed to remaining an independent plant pathology department focused on solving plant disease issues within the state and region and educating the next generation of plant pathologists. The state's fiscal shortfalls translate to unpredictable futures for many citizens, businesses and institutions in Minnesota, including the University of Minnesota. In this biennium alone, the University received an 11% reduction to its base funding from the state, amounting to a loss of about \$155 million. The College of Food, Agricultural and Natural Resource Sciences (CFANS) balanced its portion of the budget cut by reducing collegiate reserves and by salary savings from attrition of faculty and staff



positions. The University remains in a hiring pause, meaning that only critical positions can be refilled.

Since the Centennial edition of the *Aurora Sporealis*, five faculty have moved on to other positions or stages in their lives. Sincere appreciation goes to the many contributions of Professors Richard Zeyen, Sagar Krupa, and David MacDonald, who retired after a combined 115 years of service! The good news is that each has chosen to remain active and provide assistance with various departmental needs in teaching, research or service. In addition to losses by retirements, two faculty resignations occurred. Assistant Professor Dirk Hoffmeister accepted a faculty position with the Friedrich-Schiller-University Jena, in Germany. Associate Professor Charla Hollingsworth joined the USDA, APHIS, Plant Protection and

Quarantine (PPQ) as National Science Program Leader for Plant Pathology and Weeds at the Center for Plant Health Science and Technology in Raleigh, North Carolina. We wish them much success in their new positions. Given the state's economic backdrop, I am encouraged by the fact that the department's request for refilling the fungal biologist position was approved. Requests to fill other critical faculty vacancies are being considered by the Dean.

The department remains one of the top research units within CFANS. Expenditures in 2008-09 on grants reached nearly \$5 M. The agencies funding this research included the National Science Foundation, USDA-NRI, MN Small Grains Initiative, U.S. Wheat and Barley Scab Initiative, Bill and Melinda Gates Foundation, and many others. Faculty are tackling a broad range of research subjects from plant and fungal genomics to the application of science for short-term results. We are indeed fortunate to have exceptional facilities

available for conducting research and training students. One example is the newly constructed Plant Pathogen Growth Facility, which was commissioned and certified for use in 2008. This facility makes it possible for researchers at the UMN to study high impact plant diseases. Research on Ug99, a new race of the stem rust pathogen, began in the facility in early 2009. The uniqueness of the facility will position the department as a leader in high containment plant pathogen research for years to come.

Students remain at the center of the department's mission. We are pleased to have 26 students in the Plant Pathology Graduate Program. Professor Brian Steffenson completed his term (and then some) as Director of Graduate Studies. His leadership and service are gratefully acknowledged. Professor Ruth Dill-Macky began serving as the new DGS in 2009. Recently the faculty, with input from our graduate students, began identifying strategies that will take the PIPa graduate student experience from good to great. Stay tuned for more in upcoming issues...

I wish to express my gratitude to all of you for your role in making the years after the Centennial as successful as those preceding it. The creativity and dedication of our faculty, students, staff, alumni and friends will continue to bring honor to the department and recognition of the importance of plant pathology in the world.

None have done more toward this end than Dr. Norman Borlaug, the most celebrated alumnus of the department and the University of Minnesota. Since the day of his passing in September of this year, the department has mourned his loss along with the rest of the world. This issue of the *Aurora Sporealis* is dedicated to his memory. He will remain an inspiration of all that can be accomplished through hard work, persistence, determination intelligence, and humility. The department remains dedicated to continuing Dr. Borlaug's legacy and mission.

Yours truly,
Carol

The *Aurora Sporealis* is the alumni news magazine of the Department of Plant Pathology at the University of Minnesota. First published in 1924, it is the oldest consecutive alumni news magazine in the history of the University of Minnesota. All volumes are bound and available in the Plant Pathology Library in Borlaug Hall, St. Paul Campus, University of Minnesota, or online.

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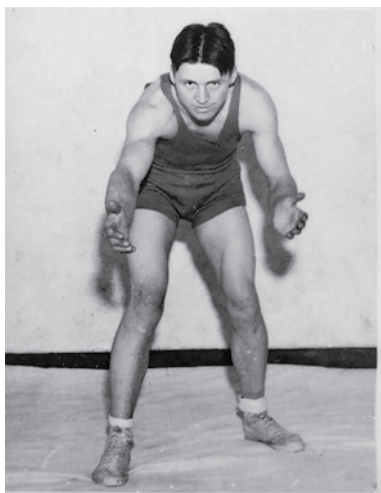
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Norman Borlaug: Plant Pathologist/Humanitarian

By Richard J. Zeyen,
Emeritus Professor of Plant
Pathology

Norman Borlaug passed away in Dallas, Texas, on September 12, 2009. He was 95. Born in 1914 on a farm near Cresco, Iowa, he was a good student and high school athlete. He came to the University of Minnesota in 1933 to wrestle and prepare to teach high school science and coach athletics. He was admitted to the General College and transferred to the College of Forestry where in 1937 he received his B.S. degree. As a college wrestler he caught the attention Professor Elvin C. Stakman, himself a former high school athletic coach. Stakman admired Borlaug's dedication, mental toughness, and persistence.



Norman Borlaug 1936 – a Big Ten Champion
at 145 lbs.

As an undergraduate Borlaug attended a talk by Stakman about stem rust of wheat and was greatly impressed. After earning a B.S. degree in Forestry, Borlaug got married on the promise of a job with the U.S. Forest Service. However the job failed to materialize and Borlaug and his new bride were in dire financial conditions. He approached Stakman about getting a graduate assistantship, which would help them financially. Stakman, acting as the Director of Graduate Studies, expressed his displeasure at Borlaug's motives, but accepted him into an M.S. program. Norman Borlaug's graduate advisors were Professors Clyde M. Christensen and Jonas J. Christensen. With Clyde Christensen he researched red stain of boxelder wood caused by *Fusarium reticulatum* and received his M.S. in 1941. With Jonas Christensen he researched flax wilt caused by *Fusarium lini* and received his Ph.D. in 1942.

In 1941 the Rockefeller Foundation asked Stakman and a team of scientists to determine what could be done to make Mexico self-sufficient in food production. After spending months touring and studying Mexican agriculture, they recommended a small-scale agricultural assistance program in conjunction with the Mexican government. It would be the first joint agricultural program of its kind. They chose departmental alumnus, Dr. J. George Harrar, to run the program. Later, in 1943, Harrar and Stakman recruited Borlaug to the program, even though Borlaug had no experience with wheat.

Continued on next page >>

Norman Borlaug *con't*

They *knew* Norman Borlaug was the man for this difficult task. Borlaug left his position with E.I. DuPont du Demours & Company and in 1944 started the “Mexican Wheat Program” at a primitive experiment station outside of Mexico City, at Chapingo. The Chapingo station was in great disrepair. The work of preparing fields and planting wheat was difficult and frustrating. Many times Borlaug questioned his decision to leave DuPont. Nevertheless, in true Norman Borlaug fashion, under harsh conditions and against all odds, he persevered.

Borlaug knew the greatest constraint to wheat production in Mexico was stem rust disease. Breeding for stem rust resistance was his highest priority. He taught his Mexican assistants how to make crosses. They collected stem rust resistant wheat from any source they could find. They made thousands and thousands of crosses during the summers in the poor soils and high elevations of Chapingo. They repeated the breeding and selection efforts in the winter under irrigation in fertile soils

at low elevations near Obregon.

This revolutionary “shuttle breeding” sped progress in identifying rust resistant wheat lines. Eventually, they produced stem rust resistant plants that could thrive in distinctly different environments and elevations. In contrast to breeding dogma, the plants lost day length sensitivity. However, when fertilized, these new wheat plants grew tall and were prone to lodging in high winds and rain.

To combat lodging Borlaug initiated crosses with dwarf wheat from Japan. The progeny were short, had stiff straw, were high yielding, and had excellent disease resistance. Plants from the Rockefeller/Mexico wheat program were grown in demonstration plots, and later in farmers’ fields side-by-side with traditional varieties. Farmers saw what happened in their own fields and quickly adopted the new varieties. Seed was freely given to anyone who requested it, or who visited the Mexican Program. Soon dwarf Mexican wheat varieties spread throughout Mexico and into Latin America. At the same time, a new race of stem rust called 15b had formed in Iowa. Race 15b exploded on the North American Great Plains causing catastrophic losses. In response, Borlaug teamed with scientists from Canada and the United States to introduce



Departmental alumni Norman Borlaug (Wheat Program) and J. George Harrar (Director of the Rockefeller Foundation’s portion of the “Mexican Program”). These tall, rust resistant wheat plants had one problem, they often lodged before harvest. Plants with stronger stems were necessary. Harrar later became President of the Rockefeller Foundation. Photo circa 1950 – Obregon, Mexico.

resistance to race 15b into many North American wheat varieties and into the Mexican wheat backgrounds.

By 1959 Borlaug thought his mission finished. Mexico's wheat production had quadrupled and Mexico was self-sufficient in wheat. But raging famines in Pakistan and India soon became a new target for these 'hunger fighters.'

Borlaug's Mexican wheats performed well in Pakistan and India, and the Rockefeller Foundation along with the Ford Foundation and others were asked by the governments of Pakistan and India to help repeat what was done in Mexico. Within a few years, after a precarious beginning, Pakistan and India tripled wheat production and reached the goal of self-sufficiency.

The "Mexican Program" had been used as a template for the International Rice Research Institute in the Philippines. Soon, other international crop research centers were formed around the world. An unprecedented agricultural revolution had occurred. The achievements in applied biology and agricultural education, coupled with worldwide support for international crop improvement centers became known as the "Green Revolution."

The Green Revolution passed unnoticed in affluent countries like the United States, but in underdeveloped countries it greatly changed people's lives and saved millions from starvation, disease and social unrest. It brought a degree of prosperity and hope to regions formerly considered hopeless. In 1965 the Rockefeller Foundation requested that Stakman and two of his original survey team of Richard Bradfield (Cornell) and Paul Mangelsdorf



Norman Borlaug and one of the many Mexican semi-dwarf wheat varieties that spawned the Green Revolution. The genetic bases used in these wheats are dominant across the world. They are now susceptible to the Uganda 99 family of wheat stem rust races.

(Harvard) document the Green Revolution. They did so in the 1967 book, *Campaigns Against Hunger*.

The Green Revolution attracted the attention of the Nobel Peace Prize Committee. They believed that it had helped millions escape famine and misery and averted wars and social upheaval. The committee searched for a representative of this immense international effort to receive the 1970 Nobel Peace Prize. They chose Norman Borlaug who always acknowledged all who contributed their talents to this vast undertaking.

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Norman Borlaug *con't*

Borlaug also clearly understood that gains in agriculture would not solve every societal ill unless it was accompanied by curbs on human population growth. In his 1970 Nobel acceptance lecture he stated:

We must recognize the fact that adequate food is only the first requisite for life. For a decent and humane life we must also provide an opportunity for good education, remunerative employment, comfortable housing, good clothing, and effective and compassionate medical care. Unless we can do this, man may degenerate sooner from environmental diseases than from hunger.”

Concerning the human population problem he said:

It would be disastrous for the species to continue to increase our human numbers madly until such innate devices take over. It is a test of the validity of sapiens as a species epithet.

By way of his scientific, technological and political pursuits, Norman Borlaug, a farm boy from Iowa, became a citizen of the world. He became a determined voice and tireless advocate for the impoverished and disadvantaged. In his 70s when most scientists retire, he teamed with former President Jimmy Carter to bring the benefits of their knowledge and status as Nobel Peace Prize recipients to the problem of poverty and hunger in Africa. In this effort Borlaug received encouragement and support from the Japanese

industrialist and philanthropist Ryoichi Sasakawa.

In 1999 a new family of pathogenic wheat stem races rust arose in the wheat-growing region of Uganda (Ug99). These races can cause disease on 70% of the world's wheat varieties (*see article by Brian Steffenson and Yue Jin on page 11*). Borlaug used his knowledge and influence to focus attention to this threat to world wheat production. The international complacency that followed the success of the Green Revolution began to lift.

In the years preceding his death, Borlaug was often honored for his lifetime of service and sacrifice. He humbly accepted these awards, such as the Congressional Gold Medal (*shown below*), and used his visibility to continue to be the voice for those that have no voice.



The world's respect for Norman Borlaug and what he and the thousands of individuals involved with the Green Revolution accomplished cannot be overstated. Norman Borlaug is held in the world's highest esteem. He joins Mother Teresa, Nelson Mandela, Elie Wiesel, and Martin Luther King Jr. as the only five people in history to have been awarded the Nobel Peace Prize, the Presidential Medal of Freedom, and the Congressional Gold Medal.

According to his daughter, Jeanie Borlaug Luabe, Norman's last thoughts and utterances concerned the plight of African farmers. He simply never ceased to be concerned for the impoverished and hungry of the world. ☺

Borlaug's Role in Combating New Stem Rust Race Ug99

By Brian Steffenson
and Yue Jin

Although Norman Borlaug was in his 90s and sometimes in frail health, he was not about to stand along the sidelines when his long-time nemesis, stem rust, was wreaking havoc in the underdeveloped world. Borlaug was instrumental in sounding the alarm about the new stem rust threat to wheat—race Ug99 or TTKS. His efforts led to international support for a global rust initiative that includes researchers at the University of Minnesota and the USDA Cereal Disease Laboratory based in St. Paul.

In 1998, William Wagoire, a Ugandan scientist, took disease notes on a wheat plot in Kalengyere, Uganda, for Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), the International Wheat and Maize Improvement Center in Mexico. Instead of sending back the expected stripe rust notes, Dr. Wagoire instead sent back

reaction data for stem rust. Thinking that there must be some mistake, CIMMYT scientists questioned Wagoire, but there was no mistaking stem rust. What

Wagoire found in the nursery was severe stem rust infection—even on wheats carrying the resistance gene *Sr31*, which had provided excellent protection against the disease in many areas of the world. A stem rust isolate collected from the Kalengyere nursery was sent for race identification to Zack Pretorius of the University of the Orange Free State in Bloemfontein, South Africa. Pretorius had done

part of his graduate work in Minnesota in the early 1980s under Dr. Roy Wilcoxson and Dr. Alan Roelfs. Pretorius typed the isolate (now designated Ug99 for Uganda and the year 1999 of the race identification) on the wheat stem rust differentials and confirmed the virulence on the widely used *Sr31* gene as well as many other important stem rust resistance genes in wheat. These results were confirmed by Dr. Yue Jin, USDA stem rust pathologist, in St. Paul, who typed the isolate on the North American differential set as race TTKS. Pretorius stated in his February 2000 *Plant Disease* article that:

Should the Sr31-virulent pathotype migrate out of Uganda, it poses a major threat to wheat production in countries where the leading cultivars have resistance based on this gene.



In 2002 and 2003, severe stem rust infection occurred on wheats carrying *Sr31* in Kenya and Ethiopia, respectively. Still, very little international attention was

paid to Ug99. In January 2005, Borlaug was called to inspect the stem rust situation in Kenya. He visited the Mau Narok station at 2619 meters elevation where he saw, firsthand, severe stem rust infection on many of the CIMMYT wheats carrying the *Sr31* resistance gene. Borlaug inspected the wheats carefully and took his own notes in the

Continued on page 27 >>

Retirements

Congratulations to **Gib Ahlstrand** on his retirement! Gib was a part of Plant Pathology from 1979 to 2001 in the electron microscopy center. There was a party in his honor on June 5, 2009, 3–6pm in the Imaging Center. ⇨



The Entomology Department Head **Mark E. Ascerno** is retiring. His retirement party was held on June 26th (5–8pm) in the Cargill Building Atrium. Mark served the university for over 33 years, and was Head of the Department for 19 years. He conducted research on floricultural and greenhouse entomology, implementing biological control into commercial greenhouse operations, temperature and day length impact on floriculture insects, and integrated pest management. His teaching centered on extension education in floriculture and greenhouse entomology. ⇨

Ann Arendt's

retirement BBQ was held at noon on Thursday, May 28, 2009. Plant Pathology faculty, staff, students, a few old timers, and other guests joined us to celebrate. Ann was presented with a memory book filled with departmental photos and letters, and instead of the traditional mug, Ann was presented with University of Minnesota wine glasses. She can put them to use as she starts her new adventure as part of the staff at WineHaven Winery and Vineyard. Ann's last day was June 5th. We will all miss her. ⇨



Deon Stuthman, Professor of Agronomy and Plant Genetics, celebrated his retirement on June 22, 2009, after 43+ years with the university. Deon was the Project Leader for Oat Breeding and Genetics and has worked closely with many Plant Pathology Department members over his career. His research interests included: durable rust resistance, cause of spontaneous mutants in selected populations, healthy agroecosystems, and international agriculture. Last summer during the International Oat Conference in Minnesota, he helped dedicate the Matt Moore buckthorn plots.

This is the only place in the world where buckthorn plants and oat plants have grown side by side for 55 years with no rotation with other plants. These plots can essentially simulate all of the crown rust virulence in the world at a single location. To start his retirement Deon and 9 family members are taking a trip to Alaska. An interview between Deon and CFANS Dean Levine can be found at: <http://www.cfans.umn.edu/enews/archive/090216.htm#2>. ↪

Howard Rines, USDA-ARS and Adjunct Professor of Agronomy and Plant Genetics retired December 18, 2008. His research centered on the genetics, genomics, and germplasm development and enhancement in oat with emphasis on molecular marker development, identification of partial resistance to crown rust, and transfer of crown rust resistance from wild oat relatives. ↪



Sagar Krupa

By Carol Ishimaru

Professor **Sagar V. Krupa** retired from the University of Minnesota Department of Plant Pathology on December 31, 2008. Dr. Krupa received the Fil. Dr. (hab.) in Physiological Botany from the University of Uppsala, Sweden, in 1971. After a postdoctoral fellowship at the University of Uppsala in Physiological Botany/ Nitrogen Metabolism, Dr. Krupa came to the University of Minnesota as a Postdoctoral Fellow in 1972 to study the effects of air pollution on plants. In 1974, he joined the faculty as an Assistant Professor in the Department of Plant Pathology, where he continued to pursue scholarship on air pollution and plants. He was promoted to Associate Professor in 1979 and Professor in 1985. A major emphasis of his research in recent years has been to conduct field studies on crop responses under ambient, chamber-less conditions, measuring key plant growth regulating parameters (air quality, climate, and biotic factors) at multiple locations to quantify the stochasticity or randomness in cause and effect.

During his 36-year career at the University of Minnesota, Dr. Krupa has contributed over 100 publications, including five books on topics related to the effects of air pollutants and global climate change on plants. His book, *Air Pollution, People, and Plants* has become a standard text in undergraduate education and a valued resource for novices interested in gaining a basic understanding of the field. For several years, he taught PIPa 3002 Air Pollution, People and Plants: The Science and the Ethics, which attracted students from diverse educational backgrounds. His commitment to graduate education included advising eight graduate

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Retirements

Sagar Krupa *con't*

students and serving as Director of Graduate Studies in the Plant Pathology Graduate Program for five years. His many professional service activities have included being Associate Editor for Environmental Pollution and Editor-in-Chief of the Book Series: *Developments in Environmental Science*.

Dr. Krupa's extensive scientific achievements and broad knowledge of the physical and chemical complexity of air pollutant impacts on plants has gained him prominence in both national and international public policy arenas. The long list of agencies/programs he has served includes the International Society of Environmental Botanists, Select Committee of the German Parliament on "Protecting the Earth's Atmosphere," Agricultural Air Quality Task Force (AAQTF) of the USDA-NRCS (Natural Resource Conservation Service) by appointment from the Secretary of Agriculture, The H. John Heinz III Center for Science, Economics and the Environment, and a UN-FAO Committee on "Climate Change and Agriculture," among others. He has been a major voice behind the science-based argument recommending support of systematic scientific efforts to ascertain the impact of impending global climate changes on agricultural crops across the world. His efforts have and will continue to have broad impacts on governmental policies and national air pollution standards. He is currently a member of the sub-committee on "Air Quality" (as it relates to ecosystem indicators) to assist in developing a technical assessment report of "The State of the Nation's Ecosystems." The report provides essential information to framers of local, state and national environmental policy, as well as business leaders and the general public.



Dr. Krupa has been the recipient of several awards and honors. Among these has included election to "Fellow" of the International

Air Pollution Control Association, and the "Distinguished International Visiting Professorship" by the National Academy of Sciences of Mexico. Both of these recognitions have rarely been given to plant scientists. He was a distinguished guest of honor at two International Conferences on "Plants and Environmental Pollution (ICPEP 2 and 3)." This year, Dr. Krupa received the University of Minnesota Sigma Xi Distinguished Service Award in recognition of his work in furthering science and scientific research in the State of Minnesota, and service to the University of Minnesota Chapter of Sigma Xi.

During retirement, Dr. Krupa plans to continue his scholarship and fulfill various service commitments. He has been reappointed to the USDA National Agricultural Air Quality Task Force, where he will serve as one of the lead authors of its white paper on the proposed National Ambient Air Quality Regulations for Particulate Matter. He will also present an invited key lecture and a lead manuscript on "Climate Change Impacts on Crop Production" at the International Conference on Sustainable Agriculture in Tuxtla, Mexico, in 2009.

Department members will miss his fun-loving spirit! ⇨

David MacDonald

By Debby Samac

On September 30, 2009, David MacDonald completed a phased retirement from the Department of Plant Pathology at the University of Minnesota. On October 14, the department, university colleagues and friends celebrated his 44 years of service to the University and the people of Minnesota. "Mac" spent his early years in Cleveland Heights, Ohio. He pursued his B.S. degree at Purdue University and majored in Horticulture. After completing military service, he enrolled at Cornell University and obtained both M.S. and Ph.D. degrees in Pomology. He joined the faculty at the University of Minnesota in 1965 to conduct research in nematology and teach nematology to graduate students. He was promoted to Associate Professor in 1969 and to Professor in 1977.

For Mac, teaching is his lifeblood. Over the years he has taught literally thousands of students about plant pathogens and how they cause disease. His main teaching philosophy is to get students to think scientifically to solve plant disease problems. A hallmark of his courses was the use of Disease Situations, which teaches problem solving using real-world examples of plant diseases, making his courses both challenging and rewarding. In 1972 Mac started teaching plant pathology to undergraduates and continued teaching undergraduate courses until his retirement. Many of his students were in the Horticulture or Agronomy programs as well as Plant Pathology. During the summer Mac taught the Field Plant Pathology course for graduate students. Over the years he built up an extensive list of experts around the state that opened their farms, orchards and businesses to his students, which allowed them to see important diseases first-hand and meet growers

and researchers working on real problems. Most recently, Mac developed an undergraduate course for non-science majors called Plants Get Sick, Too. The course has been very popular, filling up rapidly to 60 students. Mac was always strongly committed to his students and made extraordinary efforts to ensure that students had the best learning opportunities. The college recognized his dedication and talent for teaching with a Distinguished Teaching Award.

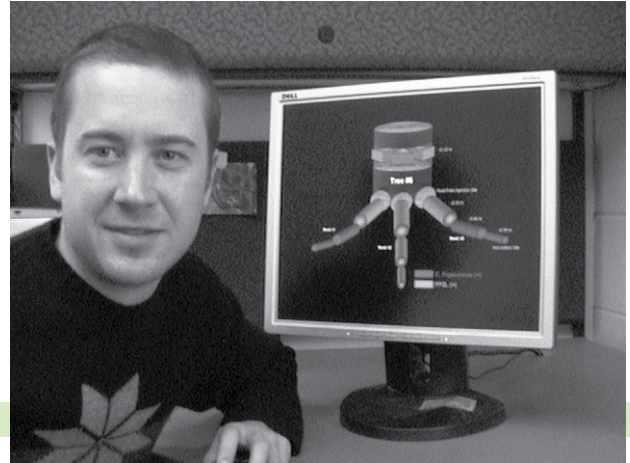


In his research Mac has tackled some of the most important nematode problems in Minnesota, including soybean cyst nematode and the complex of nematodes that cause damage on potatoes. He has worked closely with the Plant Disease Clinic providing nematode diagnoses and disease management recommendations. He also has worked closely with golf course superintendents in the management of golf greens and the nematodes found in these highly managed systems. His collaboration with plant breeders led to the release of soybean varieties and soybean germplasm with resistance to soybean cyst nematode.

In his retirement he plans to continue dabbling in nematode research, a subject he still finds fascinating, and to provide nematology expertise to the clinic on a part-time basis. ⇨

Graduating Students

Ryan Blaedow completed his Ph.D. in Plant Pathology at the University of Minnesota on April 30, 2009. His dissertation was on characterization of host-pathogen-fungicide interactions for the oak-*Ceratocystis fagacearum*-propiconazole pathosystem. Ryan currently is employed as a Pest Control Forester, Division of Forests, North Carolina Department of Environmental and Natural Resources. Jennifer Juzwik served as Ryan's major professor. ⇨



James Jacobs finished his M.S. degree in June 2008. His thesis work was with Bob Blanchette on the histopathology of white pine blister rust. James is now a Plant Health Specialist for the Minnesota Department of Agriculture working with the Plant Protection Division. ⇨

Carlos Perez completed his Ph.D. in July 2008 under the direction of Bob Blanchette. His research focused on the diseases of Eucalyptus and native Myrtaceae trees in Uruguay. Carlos is now an Associate Professor in the Departamento de Protección Vegetal, Universidad de la República, Uruguay. ⇨



Christie Almeyda-Becerra completed her M.S. degree under the direction of Dr. Ben Lockhart. Her thesis was entitled “Identification and characterization of two viruses causing previously unreported diseases of flowering maple (*Abutilon x hybridum*) and greenhouse-grown tomato (*Solanum lycopersicum L.*)” She is currently pursuing a Ph.D. at Washington State University. ⇨

Jia Zhou completed an M.S. in Plant Pathology in August 2009 directed by Senyu Chen and Jim Kurle. Her thesis was “Interactive effects between soybean cyst nematode, mycorrhizal fungi, and iron deficiency chlorosis on soybean growth and nutrient uptake.” She will be pursuing her academic career in a doctoral program at Michigan State in Bio-Statistics and Epidemiology. ⇨



Ben Alsop completed his Ph.D. dissertation in June 2009 under the direction of Professor Brian Steffenson. The title of his dissertation was “Utilization of *Hordeum vulgare* subsp. *spontaneum* for Improvement of Disease Resistance in Cultivated Barley.” Ben is now working as a maize breeder (trait introgression project) for the Monsanto Company at a research station outside of Madison, Wisconsin. ⇨

Pablo Olivera completed his Ph.D. dissertation in August 2008 under the direction of Professor Brian Steffenson. The title of his dissertation was “Genotypic and Phenotypic Diversity of Sharon Goatgrass (*Aegilops sharonensis*) and Genetics of Resistance.” Pablo is now a post-doctoral Research Associate in the USDA Cereal Disease Laboratory working with Dr. Yue Jin on the resistance of wheat and wheat relatives to stem rust. ⇨



Department Members Garner National Awards and Recognition



Carol Ishimaru Elected to Serve as APS President

Department Head Carol Ishimaru was elected Vice President of APS and will serve as President in 2011-2012. She started her term at the APS meeting in Portland. Carol sees a vibrant future for the Society. As part of her profile she wrote:

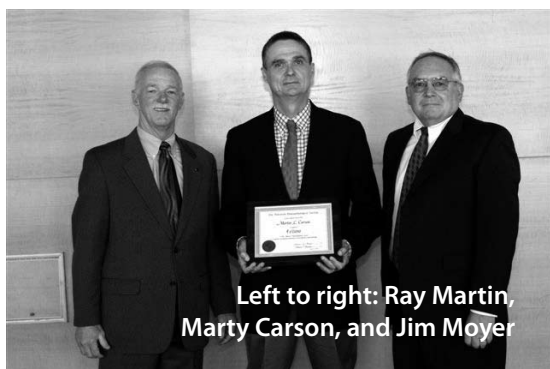
APS must continue to lead the way in translating “information age” technologies into mechanisms for capturing the interest of the brightest and best students in science. APS can serve as a warehouse for education innovation by communicating success stories for the adaptation and use by others. From FFA displays to YouTube videos, to virtual plant disease laboratories, APS must continue showcasing effective ways for connecting with a generation of student who have never lived without access to the internet. We must meet students where they are to ensure that the value and relevance of plant pathology is successfully communicated to future generations.

The department has a proud tradition of faculty serving as APS President. Carol will be the 14th member of the department to serve as APS president in the 101 years of the Society. ⇨

Marty Carson Becomes APS Fellow

Marty Carson was made a Fellow of the American Phytopathological Society at the 2009 meeting in Portland, OR. The society grants this honor to a current member in recognition of distinguished contributions to plant pathology or to the society. He began his career in 1980 as a faculty member in the Plant Science Department at South Dakota State University (SDSU), Brookings. After eight years at SDSU and with a brief stint in private industry, he joined the USDA-ARS in Raleigh, NC, in 1989. In 2002, Carson became Research Leader and Director of the USDA Cereal Disease Laboratory, St. Paul, MN.

Carson’s nationally and internationally recognized research focuses on the genetics of resistance to disease with emphasis on quantitative, partial forms of resistance. Carson has extensive accomplishments in applied research on a diverse array of maize diseases including northern leaf blight, anthracnose stalk rot, *Phaeosphaeria* leaf spot of corn, Goss’ bacterial wilt, and maize gray leaf spot. Carson was the first to demonstrate and quantify yield losses in sunflower due to several largely unstudied diseases. As a result, the potential importance of these diseases to sunflower production is now recognized, and a sound basis for setting priorities in sunflower research programs was established. Carson was instrumental in the successful establishment of the southern GEM (Germplasm Enhancement of Maize) project, serving as southern regional coordinator from 1995 to 2002. Carson has served The American Phytopathological Society in various capacities. He



was Associate Editor of *Plant Disease* and served as Associate and Senior Editor of *Phytopathology*. He has served on the Genetics, Host Resistance, and the Germplasm and Collections Committees. Carson's determination to make plant pathological research useful to solving problems and furthering the science of plant pathology is second only to his compassion for others. His concern and caring for his work and for the people with whom he works makes him a truly special person.

Marty joins other current faculty members who are fellows of APS: Bob Blanchette, Carol Windels, Corby Kistler, and Ben Lockhart.

See the complete award information at:

<http://www.apsnet.org/members/awards/2009awardees.asp#Carson/>. ↪

USDA Secretary's Honor Award

On October 22, 2008, Agriculture Secretary Ed Schafer honored U.S. Department of Agriculture employees from across the nation for exemplary service and achievements in the 61st annual USDA Honor Awards Ceremony. Earning an award for Enhancing Protection and Safety of the Nation's Agriculture and Food Supply was the Ug99 Team, led by Dr. Yue Jin of the Cereal Disease Lab in St. Paul and David Marshall in Raleigh, NC. The Secretary recognized them for excellence in rapid mobilization of research expertise and resources to assess vulnerability to Ug99 African wheat stem rust, resulting in early deployment of genetic resources to protect the nation's grain supply. Members of the team were: Rick Bennett, Harold E. Bockelman, J. Michael Bonman, Gina Brown-Guedira, Marty Carson, Blair J. Goates, Robert A. Graybosch, C. James Peterson, Michael O. Pumphrey, M. K. W. Simmons, Les Szabo, and Steven S. Xu. ↪



University of Minnesota Hosts Symposium on Climate Change and Plant Diseases

By Jim Kurle
and Carol Windels

The University of Minnesota College of Food Agricultural and Natural Resource Sciences (CFANS) sponsored a well-attended symposium “New Frontiers in Plant Health: Will Climate Change Tip the Balance Toward Disease?” on March 25, 2009. Highlighting research on the topic of climate change, the symposium addressed assessment, modeling and management to lessen negative impacts of climate change — plant disease interactions in agricultural, forested, and natural landscapes.

Dr. Carol Ishimaru, Head of the CFANS Department of Plant Pathology, moderated the session and opening remarks were made by Dean Allen Levin. Invited speakers included Mark Seeley, CFANS Department of Soil, Water and Climate (“Introduction on climate change”); Karen Garrett, Department of Plant Pathology, Kansas State University (“Anticipating and responding to biological complexity in the effects of climate change on agriculture”); Jeffrey Stone, Department of Botany and Plant Pathology, Oregon State University (“Predicting the effects of climate change on Swiss needle cast severity in Pacific Northwest forests”); X. B. Yang, Department of Plant Pathology, Iowa State University (“Climate change and crop diseases: Epidemiological views on disease management and research”); and James Kurle, CFANS Department of Plant Pathology (“Climate change and plant disease in Minnesota: Tipping the balance or adapting?”). The meeting ended with a panel discussion and closing remarks by Sr. Associate Dean F. Abel Ponce de León.

This symposium is one in a series of symposia on “Solution Driven Science,” which highlights challenging opportunities and strategic initiatives in the college. ↔

Left to right: Dr. James Kurle, Dr. Karen Garrett,
Dr. Jeffrey Stone, Dr. Carol Ishimaru,
Dr. Mark Seeley, and Dr. X.B. Yang



Philip C. Hamm Memorial Lectureship and Awards Ceremony Held at the University of Minnesota

By Liangliang Gao
and Noah Rosenweig

The Philip C. Hamm Memorial Lectureship and Awards Ceremony were held at the University of Minnesota, St. Paul Campus on April 7, 2009. The lectureship was established in 1980 by a grant from the Monsanto Agricultural Products Company in memory of the late Philip C. Hamm, an outstanding research scientist and employee of Monsanto. The lectureship is awarded annually to an individual who has made significant contributions to the plant sciences. This year, the memorial lectureship was awarded to Dr. William Lucas, Professor and Chair of Plant Biology at the University of California, Davis.

Dr. Carol Ishimaru, Head of Department of Plant Pathology and Chair of the Selection Committee, served as moderator of the ceremony. Dr. Allen S. Levine, Dean of the College of Food Agricultural and Natural Resource Sciences presented undergraduate awards to Ross Peterson (Nutritional Science and Spanish) and graduate awards to Noelle Beckman (Ph.D., Ecology Evolution and Behavior), and Yiping Qi and Yun Zhou (Ph.D., Plant Biological Sciences).

Dr. William Lucas presented a lecture "Plasmodesmata and the Phloem: Partners in the Trafficking of Information Macromolecules." Dr. Lucas' group pioneered the study of plant viruses trafficking both locally and systemically in plants. They established that plasmodesmata regulate entry into the phloem translocation stream of special populations of non-cell-autonomous proteins (NCAPs) and RNA species. These information macromolecules were found to

traffic through the phloem from mature organs to meristematic tissue where they exert control over developmental programs. Dr. Lucas' group designed experiments using grafting technique and viral infection system and demonstrated that flowering locus T protein trafficking is required for floral induction in *Cucurbita moschata*, a cucurbit species. Finally, Dr. Lucas discussed, in depth, the cucumber genome project and its implications on future directed studies of plasmodesmata and information molecule trafficking. ⇨



Left to right: Dr. Carol Ishimaru,
Yun Zhou, Dr. William
Lucas, and Yiping Qi

Dr. Robert S. Zeigler Accepts 2009 E.C. Stakman Award

By Carol Windels

The E.C. Stakman Award was presented in a ceremony held by the University of Minnesota, Department of Plant Pathology as part of its annual departmental awards day on May 26, 2009. The E.C. Stakman Award has been presented since 1956 to recognize individuals of any country and nationality for outstanding achievements in plant pathology in research, teaching, outreach, international development, or for any combination of these areas. This year, the award was presented to Dr. Robert S. Zeigler, Director General of the International Rice Research Institute, Philippines, in recognition of his research and visionary leadership that has improved crops, advanced plant pathology, impacted national and international agriculture, and fed people in developing countries. Later in the day, Dr. Zeigler presented a well-attended seminar entitled “How Can Plant Pathology Help Protect the World’s Dependence on Rice?”

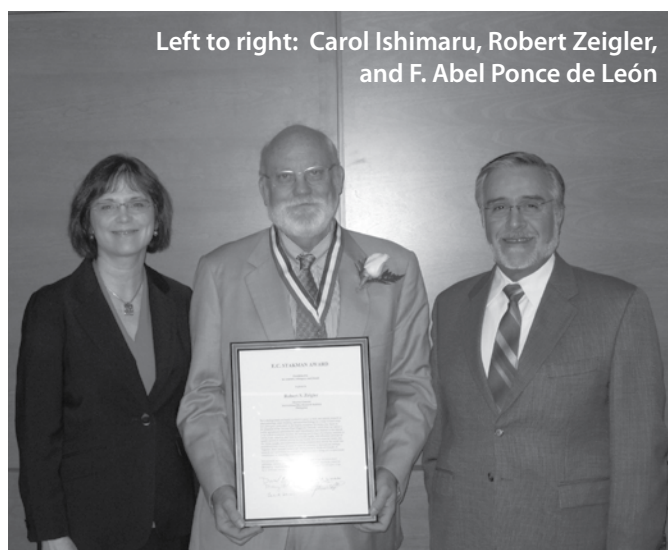
Dr. Zeigler’s international service began after receiving his B.A. in Biological Sciences from the University of Illinois when he joined the Peace Corps as a secondary school science teacher in Mokala, Zaire. Later, he completed a M.S. in Botany (Forest Ecology) at Oregon State University and Ph.D. in Plant Pathology from Cornell University. He then returned to international service in several positions, e.g. the Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia; the Institut des Sciences Agronomique du

Burundi (ISABU); and the International Rice Research Institute (IRRI), Philippines. He also served as Head of the Department of Plant Pathology at Kansas State University.

Dr. Zeigler has a distinguished and highly productive career in basic and applied research in plant pathology, plant breeding, and microbial biology on a range of food crops and pathogens, particularly in developing countries. He conceived and led development of the Global Cereals Comparative Genomics initiative, which linked the basic cereals genomics and bioinformatics research community in the U.S. with cereals improvement programs in the Consultative Group on International Agricultural Research (CGIAR) and national agricultural research programs in developing countries. Dr. Zeigler also was a key figure in development of the National Plant Diagnostic Network, which links our nation’s public agricultural institutions for rapid identification and response to introduced pests critical to national security. Together, these accomplishments are distinguished by depth and breadth of research and agricultural development

experience and a strong and compassionate commitment to improving people’s lives.

Among other awards, Dr. Zeigler is a 2009 Fellow of APS, 2008 Fellow of the American Association for the Advancement of Science, and recipient of the 2001 APS International Service Award. ☞



Plants Get Sick, Too! APS Centennial Display at the Science Museum of Minnesota

By Debby Samac

The Science Museum of Minnesota is a premier science museum and a key attraction in the Twin Cities hosting over 1 million visitors per year. As part of the APS 2008

Centennial Celebration, a display on plant pathology entitled “Plants Get Sick, Too!” was unveiled at the museum during the week of July 20, 2008, and was on display for 3 months.

The display was created by museum designers with expertise provided by an ad hoc committee of APS members:

Deborah Samac, Kasia (Duellman) Kinzer, Janet Painter, and Gail Ruhl, with APS coordination provided by Michelle Bjerckness. The major themes of the display introduced visitors to plant diseases and their impact on human society and natural habitats, and highlighted the role that plant pathologists play in understanding and managing plant diseases.

In addition to four display panels there was a hands-on activity with a video microscope allowing visitors to see plant pathogens up close and learn more about the specimen they viewed. Todd Burnes and Bob Blanchette supplied hands-on materials and

microscope slides. The most popular part of the exhibit was the Science Quiz in which visitors tested their new knowledge about plant diseases. APS

members staffed the display each afternoon during the 2008 APS meeting. During the remaining Saturday afternoons in August, department members were on hand to show visitors examples of plant diseases and to answer their questions. Participants included: Matt Bakker, Ruth Dill-Macky, Consuelo Estevez de Jensen, Charlie Barnes, Katie Breakspear, Lindsey Otto-Hanson, Tammy Kolander, John Bienapfl, Atenea Garza, and Ann Impulletti. We



also had materials on display (corn smut, crown gall, and ergot) in the museum lobby in the “Object of the Month” cabinet and Debby Samac as the “Scientist on the Spot” in the Museum’s Science Buzz website (<http://www.sciencebuzz.org/>). ↪

Plant Pathology Research Fair

By James Percich

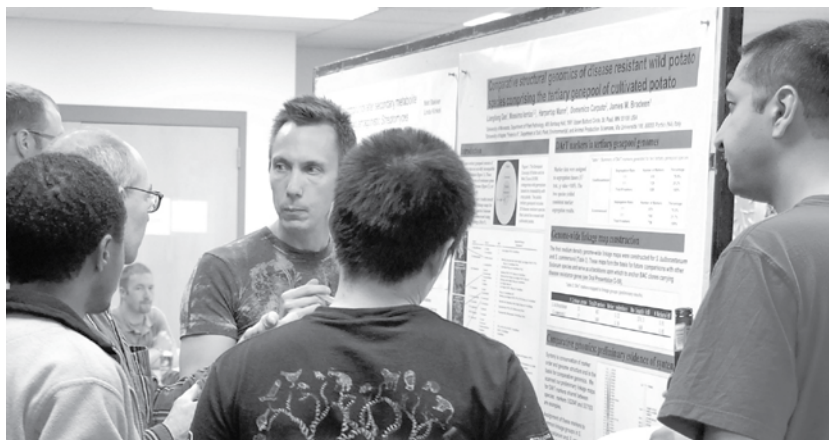
The department's Research and Outreach Committee, chaired by Dr. Nevin Young, organized the First Annual Plant Pathology Research Fair on May 18, 2009. More than 45 members of the department and guests attended the research fair, making it a success. Food and various beverages were served during the poster presentations allowing for discussion in a relaxed atmosphere. The fair was a vehicle to showcase the varied and exciting research being carried on in the department.

The 2009 Research Fair consisted of two oral presentations by faculty whose Minnesota Agricultural Experiment Station Projects were scheduled for external review and the presentation of 12 poster presentations by faculty and students. Drs. Dean Malvick and Jim Percich each gave an oral presentation highlighting their current research activities and future goals.

Dean Malvick's talk was entitled "Biology and Management of Root and Stem Diseases of Soybean in the Northern United States." Dean discussed his future research objectives and stressed the importance of using molecular diagnostic tools for pathogen detection and, perhaps, in the near future for predicting disease incidence and severity. Dean and his graduate students' research focused on *Fusarium* and *Phytophthora* species and their role in causing disease in corn and soybean. Dean's talk also emphasized the need and importance of long-term interdisciplinary studies of cropping systems and their effect on soilborne plant pathogens.

Jim Percich presented an overview of his research team's investigations into a root rot complex consisting of *Fusarium solani*, *F. oxysporum*, and *Rhizoctonia solani* that causes

significant and sustained losses in dry bean and can infect soybean, corn, and potato. Jim discussed his successful work using biological control (*Rhizobium* spp. and *Bacillus* spp.) seed treatments that resulted in significantly reducing root rot severity and increasing yields in large-scale, multi-site research demonstration sites over a three-year period. Root rot management was further enhanced when biological control treatments were used in



combination with various rotational crops, tillage, and reduced nitrogen fertilization practices.

The research posters gave an overview of many of the current research themes in the department. Seven posters described research on plant disease resistance and genomics in cereals and potato or pathogen gene expression during infection of these plants. Additional posters described plant signaling; biological control; impact of rotational crops on *Fusarium virguliforme*; impact of mist-irrigation on toxin production and accumulation in wheat by *Fusarium*; soil carbon amendments on antibiotic producing *Streptomyces* spp.; and the interactive effects of mycorrhizae, soybean cyst nematodes, and soil pH on soybean growth and iron-deficiency chlorosis. ☞

Charla Hollingsworth Joins USDA-APHIS

By Carol Windels

In November, Dr. Charla Hollingsworth joined the USDA, APHIS, Plant Protection and Quarantine (PPQ) as National Science Program Leader for Plant Pathology and Weeds at the Center for Plant Health Science and Technology in Raleigh, North Carolina. The center supports regulatory policy, decisions and operations through methods development work, scientific investigation, analyses and new technology. Dr. Hollingsworth will have responsibilities for planning, coordination, and oversight in support of the APHIS and PPQ mission. Her primary focus will be leading the development of new technologies for APHIS PPQ, support of emergency programs, and as an agency expert in plant pathology.

Dr. Hollingsworth leaves the University of Minnesota after seven years on the faculty. In 2002, she was appointed Assistant Professor of Small Grains Plant Pathology located at the Northwest Research and Outreach Center in

Crookston and in 2008, was promoted to Associate Professor. During her career at Minnesota, Dr. Hollingsworth developed nationally recognized extension and research programs in identification and management of cereal disease problems (Fusarium head blight, aster yellows, tan spot, leaf rust, *Septoria* diseases, net blotch) as well as brown root rot of alfalfa, root rot complexes of soybean, and Sclerotinia head rot of sunflower. She has published numerous research articles, extension bulletins, fact sheets and educational articles; contributed to many grower and agriculture professional events; was the original Co-Editor of the newsletter *Cropping Issues in Northwest Minnesota*; collaboratively maintained the Minnesota Fusarium Head Blight Forecasting System web site; and worked with the Minnesota Department of Agriculture to train plant pest surveyors for major diseases of wheat and barley. ↪



Department of Plant Pathology Friend of the Department 2007

By Richard Zeyen



Ms. Susan Tertell, the retired Chief of the Central Library of the Minneapolis Public Library System, received the Friend of the Department Award in 2007. Susan volunteered her professional services to index the *Aurora Sporealis*. This effort covers the volumes from 1924 (inception) through 2006. It has taken a professional's expertise and hundreds of hours of effort. Her data will be transformed into both an electronic and bound index. Susan Tertell will have transformed 82 years of the *Aurora Sporealis* into a searchable resource. She has created an invaluable tool for alumni, faculty, friends, students, and future historians. ↪

Check it out!



Become a fan of the Department on Facebook. <http://www.facebook.com/business/dashboard/#/pages/Saint-Paul-MN/University-of-Minnesota-Department-of-Plant-Pathology/72835450409/>



See Ben Held and alumnus Mark Stennes on Channel 5 News! They describe their work on testing elm trees that appear to have resistance to Dutch Elm Disease.

<http://kstp.com/news/stories/S920185.shtml?cat=1/>



Jim Bradeen and his lab were recognized by The American Phytopathological Society for the Molecular Plant-Microbe Interactions Editor's Top Pick.

In the April issue of MPMI, two reports, by Bradeen et al. and Kramer et al., analyze the effect of the RB resistance gene from Solanum bulbocastanum when expressed in commercial varieties of potato (S. tuberosum). Excellent field resistance was obtained, and the degree of resistance correlated well with transgene copy number and transcript levels.



Dr. Robert Blanchette and his lab were featured in *Smithsonian* magazine in May!

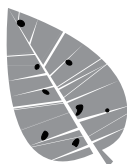
<http://www.smithsonianmag.com/history-archaeology/Digs-Finding-Feisty-Fungi.html>

College of Food, Agricultural
and Natural Resource Sciences

UNIVERSITY OF MINNESOTA

If you missed the Solution Driven Symposium “New Frontiers in Plant Health: Will climate change tip the balance toward disease?” hosted by CFANS and the department, you can listen to audio of the symposium online!

<http://www.cfans.umn.edu/ResearchOutreach/Research/SDS/NewFrontiersinPlantHealth/index.htm>



PLPa Seminars are online! This is a great way to hear about research on campus, find out what graduate students are doing, and see seminars from people visiting the department. You can access them from our home page or from this address:

http://courses.cfans.umn.edu/CFANSVideo/PLPaSeminars/PLPA_Seminars/Home.html



Is your contact information up-to-date? Submit your current information at:

<http://plpa.cfans.umn.edu/>. Click on Register for Updates.



Check out the short clip on Kare 11 from the Cereal Rust Research Day held July 23rd:

<http://www.kare11.com/video/default.aspx#/After+a+50+year+reprieve%2C+cereal+rust+may+return/47355926001>

<< Continued from page 11

field. After visiting Mau Narok, Borlaug called for immediate action to avert a destabilizing epidemic of stem rust. This call to action culminated in a Global Rust Summit in Nairobi, Kenya in September 2005 and a comprehensive report (*Sounding the alarm on global stem rust: An assessment of race Ug99 in Kenya and Ethiopia and the potential for impact in neighboring regions and beyond*) written by an expert panel. A global effort to breed wheat for resistance to race Ug99 was then launched and is now called the Borlaug Global Rust Initiative. Other government agencies and foundations became involved in supporting this research, most notably the USDA, Canada International Development Agency, and Bill and Melinda Gates Foundation. Minnesota researchers Drs. Yue Jin, Brian Steffenson and Jim Anderson are part of this global effort to combat the new stem rust threat. This was all made possible through the efforts of Norman Borlaug. ⇨

Ug99 con't

The 2009 annual meeting of the American Phytopathological Society was held August 1-5 in Portland, Oregon. The plenary session focused on

By Jason Brantner

Annual APS Meeting

“Achieving Scientific Excellence in a Changing Environment.” Dr. William Niebur with Dupont Crop Genetics and Development stressed the need for increased global productivity. Maura O’Neill, Senior Advisor for Energy and Climate, USDA, pointed out the importance of plant science in solving some of the world’s problems in food security, energy, and health. Dr. Neal Van Alfen gave the final plenary presentation on the challenges and opportunities for increasing funding for research, attracting graduate students to plant pathology, and maintaining cooperative extension programs. The department was represented by 17 attending members. Seven oral and 14 poster presentations were given (including a couple of “flash-and-dash” poster presentations). Oral presentations were given by John Bienapfl, Pravin Gautam, Yue Jin, Corby Kistler, Harpartap Mann, Greg Reynolds, and Matthew Rouse. Posters were presented by Matthew Bakker, Jason Brantner, Claudia Castell-Miller, Liane Gale, Michelle Grabowski, Ben Lockhart, Tammy Kolander, Dean Malvick, Dimitre Molloy, Pablo Olivera Firpo, Ji-Hyun Park, Matthew Rouse, Daniel Schlatter, and Brian Steffenson. In addition, Dr. Martin Carson became an APS fellow at the Awards and Honors Ceremony. Some current and former department members attended the U of MN alumni social at the welcome reception, but the department’s graduate students were most abundantly represented. Portland and the Oregon Convention Center were a great place for the meetings with good restaurants, weather, and public transportation. ⇨

NWROC News

By Jason Brantner

2009 brought a long, cold winter to the Red River Valley and along with it a spring flood and late planting for many crops. A cool summer has resulted in a nice small grain crop with a very late harvest. Sugar beet, soybean, and corn crops have continued to be behind due to the cool summer. Root diseases on sugar beet still manage to stay active with a low amount of *Aphanomyces* root rot, but a lot of *Rhizoctonia* crown and root rot. One positive outcome of the cool weather has been very low levels of *Cercospora* leaf spot on sugar beet, saving the growers money on multiple fungicide applications.

Field school and field day were well-attended despite wet, muddy, and cold conditions. Field school was held July 15-16 with around 70 Ag professionals and crop consultants attending each day. Field day was held July 17 with approximately 100 growers and Ag professionals attending.

Research continues at the NWROC on small grains, sunflower, and alfalfa with the project of Dr. Charla Hollingsworth and on sugar beet with the project of Dr. Carol Windels. In addition, Galen Thompson continues to work with plant pathologists and breeders from the St. Paul campus on screening wheat and barley germplasm for disease resistance in the Red River Valley. The NWROC continues to be a great place to work where research is focused on solving problems for growers and researchers and the agricultural industry interact regularly. ☺

Plant Pathology's 35th annual E.C. Stakman softball game was held on a beautiful, summer-like day on September 15, 2009. After seven innings, the students triumphed over the faculty, winning the game with a final score of 11-10. The softball game was followed by a barbeque on the Borlaug 3rd floor patio. ☺

E.C. Stakman Game September 15, 2009



Congratulations!

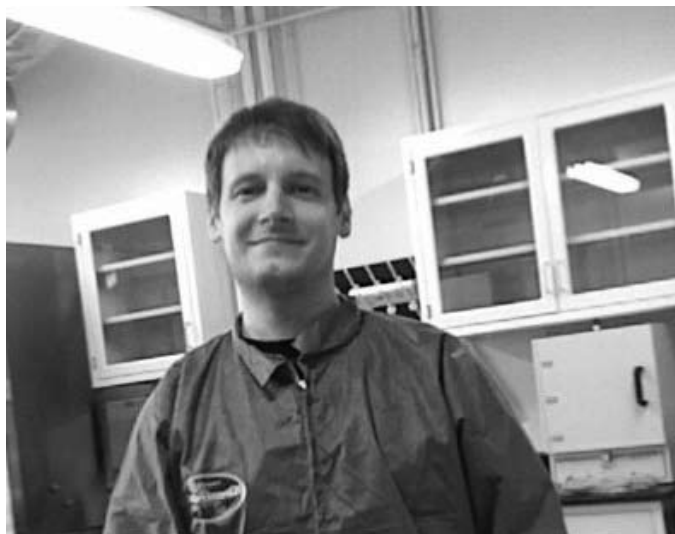
Matthew Bakker
Liangliang Gao
Atenea Garza
Ji-Hyun Park
Matthew Rouse
Daniel Schlatter

These graduate students passed their preliminary written examinations in June 2009

Dr. Mattias Persson started postdoctoral research in Dr. Brian Steffenson's group at the Department of Plant Pathology, University of Minnesota, in March 2009. He received his Ph.D. degree in November 2008 in Molecular Cell Biology from the Department of Biology and Forest Genetics, Swedish University of Agricultural Sciences. His thesis title was "Cell death and defense gene responses in plant-fungal interactions." His primary focus is to study immunity of rice to rust fungi, since rice is the only major cereal not attacked by these pathogens. Currently, Dr. Persson is screening thousands of rice germplasm lines to identify those with a susceptible reaction to rust pathogens. The results will open many doors for genetics and genomics research in studying non-host resistance. The research is funded by the Bill and Melinda Gates Foundation. ↪

New Department Members

Anne Lageson is the new Executive Secretary in the department. Anne has been employed as the Coordinator (Program Associate) in the Cardiology Fellowship Program, Academic Health Center, and prior to that was the Executive Administrative Specialist for the same program. She has held various other positions including Backcounty Cook for the Philmont Scout Ranch in New Mexico, and as a Principal Secretary at the U of MN. Anne indicated that she loves to garden and is excited to be a part of our department. ↪



News from the Cereal Disease Lab

By Marty Carson

It's been a very busy year at the CDL as we continue to be at the forefront of the worldwide response to the Ug99 stem rust crisis. We will be adding a new position working on host/pathogen interactions of cereal rusts this coming year. While we can only work with foreign isolates for three months in mid-winter (December, January, and February), over 40,000 data points were generated last year in our Ug99 testing (a data point consists of one variety/genetic stock/breeding line inoculated with a single isolate). Yue Jin has been examining the potential role of a barberry, *Berberis holstii*, in the epidemiology and population biology of stem rust in East Africa, having just returned from a survey trip to Kenya and Tanzania. Les Szabo continues to search for the origin(s) of Ug99 using molecular markers, and is also developing molecular diagnostics for Ug99. Corby Kistler, "Mr. Fusarium," continues his work on comparative genomics of the Fusaria. Jim Kolmer has been tracing the origins of leaf rust races in North America using molecular and virulence markers. And as for me, let's just say I'm busy sowing my wild oats (literally). Two CDL post-docs (and department alums), Charlie Barnes and Maria Ordonez got married and returned to Ecuador this past year. Pablo Olivera (Ph.D. Steffenson) and Jo Anne Crouch (Rutgers) have joined the group as post-docs with Yue Jin and Les Szabo, respectively. ⇨

Norman Borlaug Print

By Sarah Morean

In September 2008, just as I became Library Assistant for the Plant Pathology Library, local screen-printer Pat Callahan was hungry for a new project. I admired a series of screen-printed portraits he'd made in college, and suggested he create a Norman Borlaug print for me that I could put up in my office. He accepted the challenge, and pulled nearly 120 four-color Norman Borlaug prints within a few months.

The department later gave one of the framed prints to Borlaug on his 95th birthday, hand-delivered by Brian Steffenson (who almost wasn't allowed to take it on the plane because of its metal frame).

Pat's wife, Cara Callahan, is a framer at FrameUps, and she framed both Borlaug's print and mine with the same copper-hued metal and cream-colored mat. A third print was later framed

in the same way for the department's office. Visit the library or office sometime to see Pat's lovely art! ⇨



Around Campus



Borlaug Hall Gets Weatherproofing

The summer of 2009 found construction crews ringing Borlaug Hall once again. The underground portions of the building have been plagued with water leaks for many years with some rooms becoming unusable due to mold and mildew growth. Department members had an excellent view of the excavation of the building from the Kiva (courtyard between Christensen Labs, Stakman Hall and Borlaug Hall). New windows were also installed on the front side of the building. ↪

Falcon Heights Farmer's Market Comes to the St. Paul Campus

For years the St. Paul Farmer's Market held a popular market on summer Tuesday mornings at the HarMar Mall in Roseville. Changes at HarMar prompted the market to seek a new location. In 2002, Twin City Co-ops Federal Credit Union approached the St. Paul Farmer's Market to offer their north parking lot as a possible site for the market, in the interest of providing a new amenity in the community of Falcon Heights. However, at the end of 2008, they announced that it would no longer be able to host the market. The search was on for another site close to Falcon Heights. In May 2009, the Farmer's Market reopened on the University of Minnesota campus on the corner of Gortner and Larpenteur.

Do you eat locally? Most of us take for granted being able to eat fresh produce all year long. Amazingly, just getting food from the farm to our tables uses almost as much total energy as was used to grow it. On average food travels 1500 miles before it reaches your plate! Eating locally lets you get the freshest and best tasting food, saves energy, and supports local farms. How can you eat locally? Here are a few ideas. Look for locally produced foods in your grocery store, shop at a farmer's market, subscribe to a crop share from Community Supported Agriculture (CSA), plant a garden, and patronize restaurants that feature locally produced foods. See the following website for more ideas and information:

http://www.misa.umn.edu/Local_Food_Consumer.html/. ↪



2009 Department of Plant Pathology Awards

FRIEND OF THE DEPARTMENT

Jerry Kruger

In recognition of service, vision and leadership to the wheat industry, and in particular, for leadership in supporting and securing funding for wheat disease research, through his dedication and vision, Jerry truly has been a friend of the Department of Plant Pathology.

Jerry owns and operates a diversified farm in northwestern Minnesota, raising wheat, soybeans, canola, and sunflowers. He also serves on the Research and Technology Transfer Committee for the soybean commodity. ⇨



ANNUAL CIVIL SERVICE AWARD OF EXCELLENCE

Stephanie Dahl

For outstanding laboratory management and contributions to Dr. Steffenson's small grains research project; for active participation in the design, construction, commission, and certification of the BL3 Plant Pathogen Facility on the St. Paul campus; and for continuing active support and involvement in departmental activities. ⇨



FRED I. FROSHEISER SCHOLARSHIP

Ji-Hyun Park

advisor: Jenny Juzwik

For outstanding scholarship (GPA=3.89) and significant contributions to forest pathology and all aspects of graduate studies.

Ji-Hyun's Ph.D. research used traditional and molecular techniques to identify *Ceratocystis* a new pathogen on hickory; in addition, she is conducting histological research on mechanisms of attack and host defense responses in this pathosystem. ⇨



STEINSTRAND AND MERONUCK GRADUATE STUDENT TRAVEL AWARD

Liangliang Gao

advisor: Jim Bradeen

To attend the Plant and Animal Genome Conference in San Diego, January 9–13, 2010. Liangliang will present results of high throughput sequencing technologies on the potato tuber-*Phytophthora infestans* interactome. ⇨



Ji-Hyun Park

To attend the 2009 American Phytopathological Society meeting in Portland. Ji-Hyun will present a poster on "Fungi isolated from cankers and galls on hickories exhibiting crown decline or dieback." ⇨

ELWIN L. STEWART GRADUATE STUDENT TRAVEL AWARD

Greg Reynolds

To attend the 2009 American Phytopathological Society meeting in Portland. Greg will present an oral paper “Hyperspectral remote sensing for detection of *Rhizoctonia* crown and root rot in sugar beet.” ☞



Matt Rouse

advisor: Yue Jin

To attend the 12th International Cereal Rust and Powdery Mildew Conference in Antalya, Turkey (October 13–16, 2009). Matt will present research on the adaptation of race TTKSK of *Puccinia graminis* f. sp. *Tritici* (Ug99) to infection at low temperatures. ☞

M.F. KERNKAMP SCHOLARSHIP

Greg Reynolds

co-advisors: Carol Windels and Ian MacRac

For outstanding abilities in scholarship (GPA= 3.85), research, all aspects of graduate studies, and for participation in department activities. Greg’s M.S. research applies remote sensing technologies to detect *Rhizoctonia* in sugar beet. He recently was a teaching assistant in “Pests and Crop Protection” and currently is on the Development, Alumni and External Relations Committee. ☞

ANNUAL PROFESSIONAL AND ACADEMIC AWARD OF EXCELLENCE

Yanhong Dong

For excellence in managing and coordinating the mycotoxin analysis laboratory for departmental research on *Fusarium* head blight as well as for wheat and barley programs in Minnesota and

other states. Dr. Dong also has a gift for working effectively with collaborators and mentoring those who work in her laboratory. ☞

ADDITIONAL RECOGNITION

Brian Steffenson

In recognition of dedicated and outstanding service to graduate students, the department, college, and university during his 4.5 year term as Director of Graduate Studies (DGS). As a highly effective DGS, Brian played a key role in recruiting new students and obtaining graduate student fellowships. ☞



Debby Samac

Selected by graduate students in the department for the Distinguished Mentor Award. She is truly dedicated to students and is an outstanding teacher, researcher, advisor, and role model. Through her knowledge, enthusiasm, and willingness to work and visit with students, she is a daily inspiration to them to grow and excel academically and scientifically. ☞

Ann Arendt

For exceptional service and dedication in the plant pathology department office for over 30 years. Ann’s positive, friendly, and helpful personality and understanding of the policies and procedures of the department and university, extensive network of contacts, and dedication to the department’s mission made her an invaluable asset to the office. She has been an outstanding colleague and is missed by all. ☞

In Memory

Mary Lou Merrill passed away on May 11, 2009. Mary Lou was the wife of Plant Pathology alumnus William Merrill, Jr. (M.S. 1961, Ph.D. 1963; Advisor David French). More information can be found at <http://www.legacy.com/obituaries/centredaily/obituary.aspx?n=mary-lou-merrill&pid=127427298>. ↵

Plant Pathology faculty, staff, and students were saddened by the sudden passing of **Professor Peter Graham** from the Department of Soil, Water and Climate on May 9, 2009. Peter started



his career with Centro Internacional de Agricultura Tropical (CIAT) in Cali, Columbia and was recruited to the University of Minnesota in 1982. He served on the advisory committees of many Plant Pathology students and collaborated with Plant Pathology faculty. He maintained vibrant international collaborations and taught training courses in Soil Biology and Nitrogen Fixation in Mexico, Venezuela, Colombia, Uruguay, and Argentina. He maintained a collection of over 1000 strains of rhizobia that were available to the research and farming community. His research interests included: prairie restoration; rhizobium ecology and diversity in prairie environments; prairie fragmentation and below-ground diversity; rhizobium strain selection and inoculants formulation for grain; pasture and prairie legumes;

and host rhizobium strain selection and edaphic stress. You can read more about Peter and his work at http://www.soils.umn.edu/profiles/profiles_pgraham.php. ↵

Dr. Harry Curtis Young, Jr. (M.S. 1943, Ph.D. 1949; Advisor J.J. Christensen) of Pagosa Springs, Colorado, passed away on February 22, 2009, and has now joined his wife, Joan Maurer Young, whom he loved for over 65 years. He was a loving husband, wonderful father of four children, and devoted scientist. He touched many lives, especially the Boy Scouts in Troop 15 in Stillwater, Oklahoma; his colleagues and graduate students at Oklahoma State University; his many friends in the International Flying Farmers; and in the Gray Wolves Ski Club which he help found in Pagosa Springs.

Dr. Young was a Guggenheim Foundation Fellow, a Fullbright-Hayes Senior Post-Doctoral Fellow; member of Sigma Xi, and the American Phytopathological Society amongst many groups, and worked for the Ford, Guggenheim, and Rockefeller Foundations as well as the International Center for Maize and Wheat Improvement (CIMMYT). He became Professor Emeritus in 1982 when he retired, and he and Joan moved to Pagosa Springs.

Harry loved the sport of golf, spending so much time on the links that he developed a secondary specialty in diseases of bent grass greens. He continued to play golf after his 90th birthday. Like many people in his generation, he was fascinated with Lindburgh's flight and aviation in general. After establishing wheat test plots in many areas of Oklahoma, he took up flying to check his plots, and became an avid pilot-single, twin engine instrument rated.

Harry maintained a close connection with the University of Minnesota. He sent OSU students to the department for course work and sent Gene Saari, Mike Prescott, and Tom Kucharek to Minnesota, co-advising them with Kernkamp. ↵

New Students

Greg Reynolds

Greg grew up in Aurora, IL, and received his B.S. in Applied Plant Science (2007) from the University of Minnesota. He is a M.S. student working with Dr. Carol Windels on assessing the potential for remote sensing of *Rhizoctonia* crown and root rot in sugar beet. The technique could be used to rapidly assess fields for the disease using aerial imagery. ⇨

Yuan Chai

Yuan was born in Henan Province, China, and graduated in 2008 from Tsinghua University with a B.S. degree in Biological Science. He is a M.S. student working with Dr. Brian Steffenson to elucidate the role of stem rust resistance genes identified in barley using either transgenic methods or virus-induced gene silencing. ⇨

Jeltie Voth-Hulshout

Jeltie attended the Fontys University in Eindhoven, the Netherlands, and received a B.S. degree in Microbiology. She came to the University of Minnesota to complete an internship in the Department of Agronomy and Plant Genetics as part of her undergraduate degree. Upon graduation, she began M.S. studies with Dr. Ben Lockhart and is working on characterizing a novel virus in *Asteraceae*. ⇨

Bullo Mamo

Bullo was born in Wolliso, Ethiopia, and got his B.S. degree in Plant Sciences (2002) from Alemaya University in Ethiopia and his M.S. degree in Plant Biotechnology (2007) from Wageningen University in the Netherlands. He is a Ph.D. student advised by Dr. Brian Steffenson. Bullo's research involves screening wild barley and world barley collections for resistance to stem rust race Ug99 to characterize resistance and map effective resistance genes. ⇨

Pang Zhou

Pang comes from Xi'an Jiaotong University, located in the Shaanxi province of China, near the very middle of the country. There, Pang studied forensic genetics, including bioinformatics, association mapping and population genetics – primarily in humans. Along the way, he became interested in extending his genetic and genomics expertise to the study of plants, especially questions in evolutionary and functional biology. Pang also has a strong background in programming and website development. Pang is joining Dr. Nevin Young's lab to work on the *Medicago* hapmap project. ⇨

Lian Lian

Lian Lian was born in Shandong Province, China, and obtained her B.S. degree in the Department of Plant Pathology at China University in 2009. She will be a Ph.D. student working with Dr. Senyu Chen on genetics and molecular aspects of soybean cyst nematode resistance genes in soybean. ⇨

The Aurora is going green!

This is the last paper issue! All alumni and friends will receive a pdf copy of the *Aurora* by email. Please ensure we have your current email address at:

http://plpa.cfans.umn.edu/Register_for_updates.html/.

If you wish to receive a printed copy, you need to tell us by either email to Anne Lageson (lages001@umn.edu), the new departmental Executive Secretary, or by a letter sent to Anne Lageson, 1991 Upper Buford Circle, 495 Borlaug Hall, St. Paul, MN, 55108.

Back-issues of the *Aurora Sporealis* can be found on the University Digital Conservancy at this URL:

<http://conservancy.umn.edu/handle/817/>.

Aurora Sporealis 1924 - 2006 Personal Name and Subject Index online: <http://purl.umn.edu/44443/>.

Lending a Helping Hand

Think back. Can you remember the thrill you felt when you first learned that you were accepted as a graduate student in Plant Pathology at the University of Minnesota? What about the feeling of anticipation before attending your first scientific meeting and presenting your own research? Do you recall the honor and pride you felt at receiving a travel award or a fellowship? With your help, we can continue to similarly affect a new generation of other students by offering them a world-class graduate experience in plant pathology.

The University of Minnesota continues to be a place where energetic and creative scientists are developed who will address pressing new problems in plant health around the world. However, many things have changed over the past 25 years or so. There has been a continual reduction in public support of higher education across the country. As a result, land grant and other public universities are functioning differently. They must operate more like privately funded universities, with higher tuition, sky rocketing costs for benefits, and a heavy reliance on competitive grants to fund research. Plant Pathology has changed to reflect these new financial realities. Currently, there are no full-time state supported research technicians and few faculty have “hard money” to support graduate student assistantships. The field plots in St. Paul and Rosemount are “for fee” operations, as are the green houses and growth chambers. The costs for technical support staff, lab supplies, equipment, telephone service, field plots, greenhouse and growth chamber space, and general supplies such as pens and paper are faculty responsibilities through grants and contracts.

How are we doing? The department has a long history of obtaining a very high level of

grant support, the highest per capita in the college. These efforts advance the science underlying plant pathology. They also support the research of graduate and undergraduate students. As alumni, friends, faculty, and staff, you can make a difference in the number of students we can support and the quality of their education.

Let's be honest. Every day some organization is asking you for money to support a “good cause.” How would money you donate to the department

used? It goes to support graduate students and plant pathology research. Your donations go into the endowment trust fund of your choice. Depending on the fund, interest earned in the fund supports scholarships, fellowships, library acquisitions, enables students to travel to professional

meetings, pays graduate student tuition, or supports an endowed professorship. If Dr. Stakman had not been able to grant Norman Borlaug a Research Assistantship, it is possible that the Green Revolution would never have occurred and the world would be a very different place today. Is the next Nobel Laureate being turned away because we lack funds to support his or her graduate education?

For the department's Centennial Celebration, many friends and alumni donated to the department. Please consider making a donation to the department an annual habit. Remember, many companies will match donations made by employees, thereby doubling the impact of your gift. To honor the great lifetime achievements of Dr. Borlaug and his continuing efforts to inspire young scientists in agriculture and humanitarian causes, the Department of Plant Pathology established in 2007 two Norman E. Borlaug Graduate Fellowships in International Agriculture. One fellowship will be for female applicants and the other for male applicants. When fully endowed, the fellowships will

As alumni, friends, faculty, and staff, you can make a difference in the number of students we can support and the quality of their education.

provide a generous stipend and research funds to attract the best applicants from around the world to the Department of Plant Pathology. In accordance with Borlaug's wishes, the Graduate Fellows must conduct their research on a small grain cereal crop (e.g. wheat, rice, barley, oat, or rye), and spend at least two growing seasons of their research and/or outreach and educational activities in an underdeveloped country before being granted their degree.

To fully fund two Norman E. Borlaug Graduate Fellowships in perpetuity, a \$2.0 million endowment will be needed. The 21st Century Fund of the University of Minnesota will match the interest paid from donations of \$20,000 or more to these fellowships, but this is for a limited time only. We appreciate any size donation to make these fellowships a reality and keep the department in the forefront of international agriculture and fostering humanitarian causes.

The University of Minnesota Foundation has information on donating that you can access in a number of ways. Complete information is available

at the Foundation homepage at: <http://www.giving.umn.edu/>. You may contact the Foundation at 612-624-3333 or 1-800-775-2187 for help with making your gift or for more information on giving. In the College of Food, Agricultural and Natural Resource Sciences, the Development Officer for Plant Pathology is Adam Fischer. He can be contacted at 612-625-5766 or afischer@umn.edu.

In addition to cash gifts, there are several other ways donors can contribute to Plant Pathology Endowments. These include gifts of stock, bonds, treasuries and mutual funds, and gifts of property, among others. Planned future gifts include gifts that produce an income and gifts by will or trust. For confidential

inquiries concerning any type of gift please contact either the UM Foundation or CFANS Development Office.

Our students and department members would like to thank previous donors for making it possible for students to conduct their research, travel to meetings to present their research, and support other scholarly activities reported in this issue of the *Aurora Sporealis*. ↪

We appreciate any size donation to make these fellowships a reality and keep the department in the forefront of international agriculture and fostering humanitarian causes.

Contributions may be made in the following ways:

- Online from the Department home page (<http://plpa.cfans.umn.edu/>) under Fellowships, Scholarships, and Endowments or from the UM Foundation home page at: <http://www.giving.umn.edu/index.html/>.
- By telephone using a credit card: 612-626-8560 or 800-775-2187 and leave your full name and phone number, the type of credit card, card number, expiration date, amount of your gift, and if/where you would like the gift to be designated.
- Gifts may be mailed to:
University of Minnesota Foundation
CM-3854
PO Box 70870
St. Paul, MN 55170-3854

Faculty Activities

Robert A. Blanchette: Forest Pathology

There are several continuing forest pathology projects including studies on tree defense mechanisms in white pine to white pine blister rust, selecting elms from Minnesota that are resistant to Dutch elm disease, identifying *Phytophthora* species affecting woody plants, determining the etiology of Eucalyptus diseases in Uruguay as well as studies involving wood decay in historic structures around the world. Some of our recent projects to help museum curators and conservation scientists include work with the Mariner's Museum and the USS Monitor, Montezuma's Castle in Arizona, East Base and other historic buildings on Deception Island and the Antarctic Peninsula region, UNESCO protected wooden churches in Chile and ancient furniture from several tombs in Turkey. New projects have also started on canker diseases of pagoda dogwood, histopathology studies of laural wilt on red bay and avocado trees and selecting fungi for degrading woody biomass for use in biofuel production. Since the newsletter will now be online, see my web site for more information and the latest publications: <http://forestpathology.cfans.umn.edu/publications.htm> and links to recent news stories about our research: http://forestpathology.cfans.umn.edu/pdf/Antarctica%20Solutions_Summer2009.pdf <http://www.smithsonianmag.com/history-archaeology/Digs-Finding-Feisty-Fungi.html> <http://www.new-ag.info/focus/focusItem.php?a=796>. ↪

Jim Bradeen: Potato Pathology and Genomics Lab

The Potato Pathology and Genomics Lab said goodbye to two Ph.D. students this year. Massimo Iorizzo earned his Ph.D. and is currently a postdoc at the University of Naples in Italy. Adriana Telias earned her Ph.D. and is currently a postdoc at the University of Maryland. They are both missed! But we also are delighted to welcome Andrea

Clark. Andrea is a M.S. student in the Applied Plant Sciences program and is pursuing a project aimed at molecular mapping of disease resistance genes in rose, a collaboration between Jim Bradeen and Professor Stan Hokanson (Department of Horticultural Science). Graduate students Liangliang Gao and Steven McKay and postdocs Noah Rosenzweig and Harpartap Mann round out our current research team. We've been fortunate in publishing our research in *Molecular Plant-Microbe Interactions*, *Genetics*, and *Theoretical and Applied Genetics* this year. During the summer, Jim was an invited speaker at the 3rd National Plant Breeding Workshop in Madison, WI. This fall, he's been hard at work editing a new book on potato genomics. And, as an outreach effort, Jim recently initiated PotatoBits on Twitter, "tweeting" daily potato science facts to a growing number of followers. Check it out! ↪

Senyu Chen: Soybean Cyst Nematology

2009 was a busy year for me. I had a few projects initiated this year to study various aspects of soybean cyst nematode (SCN) biology and management. The soybean cyst nematode continues to be a major threat to soybean production in Minnesota. The nematode is spreading toward the northern border of Minnesota. Recently, the infestations of the SCN in Norman and Red Lake Counties have been confirmed, bringing the total number of SCN-infested counties up to 62 in the state. Another issue in SCN management is the emerging of virulent phenotypes that can overcome the resistance in commonly used commercial cultivars. Current research emphases in my group are on developing new sources of resistance and studying the ecology of nematode-suppressive soils. In collaboration with plant pathologists and plant breeders in the University of Minnesota and China, we are evaluating new sources of SCN-resistance and breeding soybean lines or cultivars with new sources

of SCN-resistance. A four-year research project initiated this year is aimed to determine 1) nematode suppression associated with cropping system including tillage, soil fertilizer application, and crop sequences; 2) species and abundance of nematode antagonists associated with nematode suppression under various cropping systems; and 3) nematode community structure and function associated with soil suppressiveness to plant-parasitic nematodes. We expect our research will develop new technology for effective management of SCN. ⇨

Ruth Dill-Macky: Small Grains Pathology

Professor Dill-Macky's small grains pathology group continues to focus their research on the diseases of wheat, barley and oat that most impact Minnesota's crops. Fusarium head blight (FHB or scab) of wheat and barley remains the most important disease impacting wheat and barley production in Minnesota. Fusarium head blight has increased worldwide over the last two decades, most likely as a result of the widespread adoption of conservation tillage practices. In the past couple of years the small grains pathology project has developed a collaboration with scientists in Norway. *Fusarium* infection and *Fusarium*-associated mycotoxin contamination of oat has been increasing of concern in Norway in recent years. As part of this collaboration Dr. Dill-Macky hosted a graduate student from the Norwegian University of Life Sciences (UMB), Selamwit Tekle Gobena in Minnesota last summer and spent six weeks at the UMB and Bioforsk Research Center in Ås, Norway engaged in field and laboratory experiments on FHB in oat. In order to foster scientific exchange with graduate students and the Norwegian researchers during her time in Ås, Dr. Dill-Macky participated in regular lab meetings, informal and formal workshops and seminars, and a graduate student journal club. ⇨

Charla Hollingsworth: Extension Plant Pathology

Crop production in the Red River Valley is challenging and so is being the resident extension plant pathologist. Agricultural growers juggle the economic benefits derived from larger crop yields with managing production risks and input costs. My extension and research programs are focused on providing applicable, science-based recommendations so agricultural producers in Minnesota, North Dakota, and South Dakota can make informed disease management decisions.

My program's research outcomes have reinforced the value of managing wheat diseases using an integrated disease management approach. Experiments planted into commercial production fields test crop responses resulting from varietal disease resistance, fungicide application, and/or crop rotation. In addition to partial grant support, a working partnership with Ross Seed Co. of Fisher, MN, makes these sites a success. A well-attended field day is held at the Fisher test location each July where extension education on plant disease issues and a great supper are served!

Fungicide application is routinely used to manage diseases on wheat and barley. However, reoccurring epidemics of bacterial leaf streak (wheat) and bacterial blight (barley) have many producers scratching their heads about management strategies. Plant pathologists from the tri-state area (MN, ND, SD) are working toward educating growers about recognizing bacterial versus fungal disease symptoms. We are also developing a protocol for testing wheat breeding lines in support of plant breeders which is focused on achieving greater varietal resistance levels.

In any given growing season crops can be challenged with drought/floods, heat/cold, diseases, insects, and weeds. I'm doing my best to reduce the risk of crop loss from disease while at the same

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Faculty Activities *con't*

time being mindful of the economic ramifications from costly disease management recommendations. While rewarding, it's never easy. ⇨

Jenny Juzwik: Northern Research Station, U.S. Forest Service, St. Paul, MN

In 2008, Dr. Jenny Juzwik concluded a five-year field study on the efficacy of propiconazole in preventing root graft transmission of the oak wilt fungus in red oaks. She is currently studying the interaction and/or relationship between the hickory bark beetle, the hickory timber beetle and *Ceratocystis smalleyi* as part of a larger project on decline and death of bitternut hickory. She is also coordinating a multi-faceted project on Annosum root rot with the Wisconsin DNR, the University of Wisconsin-Madison and other U.S. Forest Service scientists. Paul Castillo rejoined the lab group in August 2008 after working two years with Forest Inventory and Analysis in Michigan. A highlight of the year for Jenny was a delightful visit in March 2009 with colleagues Jolanda Roux and Mike and Brenda Wingfield, FAVI, University of Pretoria, South Africa. She and Prof. Roux are conducting parallel studies on insect vector relations of important forest diseases associated with or caused by *Ceratocystis* species.

Ryan Blaedow successfully defended his Ph.D. Thesis (Use of the Systemic Fungicide Propiconazole for Oak Wilt Management: an Assessment of Uncharacterized Host-Pathogen-Fungicide Interactions) following his excellent thesis seminar in mid-October 2008. He officially graduated in April 2009 and is gainfully employed by the state of North Carolina working in a forest health and pest management position.

Ji-Hyun Park passed her prelim written

exam and has been working diligently on her Ph.D. thesis research. Her current research is focused on elucidating the role of *Ceratocystis smalleyi* in the decline, dieback, and mortality of bitternut hickory in the north central and northeastern regions of the United States. ⇨

Jim Kurle: Soybean Disease Management

My research efforts emphasize management of soybean diseases. After several years of attention paid to the threat of soybean rust we have returned to our principal interest, soil borne pathogens, particularly *Phytophthora sojae* and *Fusarium* spp. Dr. Paul Meyer is investigating the role of temperature and moisture in infection and disease development. His research has yielded results indicating that infection by the *Fusarium* spp. occurs at both low and high temperatures and that multiple *Fusarium* species cause disease rather than *Fusarium solani*, which had been considered the sole pathogen. We also initiated research into the interaction of mycorrhizal fungi with soybean cyst nematode and iron chlorosis, a serious yield limiting condition caused by both biotic pathogens and abiotic factors. This research was the basis for Jie Zhou's M.S. research carried out in collaboration with Dr. Senyu Chen. We have also been investigating the effect of crop sequence and host range on persistence and severity of Sudden Death Syndrome caused by *Fusarium virguliforme*, a serious disease of soybean that occurs throughout the soybean growing states but was only recently confirmed in Minnesota. This work is being conducted as M.S. research by Tammy Kolander, who is co-advised by Dr. Dean Malvick and me. Dean and I also collaborated on research on *Fusarium solani*. This effort was conducted by Lindsey Otto-Hansen, who is now in Dr. Linda Kinkel's lab.

This work has depended on the efforts of our graduate students and the professional staff. The past year was marked by changes among this group.

Sharon Lewandowski, who had worked for me as an adaptable and highly productive scientist, accepted an early retirement offer by the University. Before that she had been employed by Dr. Bill Bushnell in the Cereal Disease Lab and had completed both undergraduate and master's degrees while working at the university. Her able replacement is Grace Anderson who recently completed a Master of Agriculture degree working with Ben Lockhart and Bud Markhart of the Horticulture Department. Jie Zhou completed her M.S. degree in August and began a graduate degree in statistics at the University of Michigan. ⇨

David MacDonald: Plant Nematology

D. MacDonald, like other Midwest plant nematologists, has been concerned about the soybean cyst nematode's ability to develop "Resistance to Resistance." In response to that threat he has been working with D. Mollov in an attempt to get a SCN Management Service involving modified HG Type identification offered by the Plant Disease Clinic. This summer he worked with 25 other faculty, staff, and other agriculture/horticulture professionals who once again taught PIPa 5202, Field Plant Pathology. This fall he again has the privilege of helping Jim Percich teach the Biology of Plant Disease (PIPa 5201) course. ⇨

Dean Malvick: Corn and Soybean Extension Pathology

Diseases of soybean and corn continue to challenge crop producers and fascinate all who work closely with their biological intricacies. The row crop pathology research and extension program directed by Dean Malvick has been very active over the past year. Staff and graduate students working in this program include Crystal Floyd (Research Fellow), John Bienapfl (Ph.D. candidate), Ann Impullitti (Ph.D. candidate), and Tammy Kolander (M.S. student). Research and extension activities have focused on root and stem diseases of

soybean (especially brown stem rot, Sudden Death Syndrome, Fusarium root rot, soybean rust, and PCR-based diagnostics), but some work also focused on corn disease issues (foliar fungicides and seed treatments). The work addresses multiple aspects of the diseases in the laboratory, greenhouse, and field, with the goals of understanding of the biology of the diseases and improving methods to manage and reduce risk of disease. Several manuscripts and abstracts were published, and presentations at regional, national, and international meetings received much attention. More information on soybean diseases (corn will be added soon) in Minnesota is available on a new Minnesota Crop Diseases web site (www.extension.umn.edu/cropdiseases/). ⇨

Deborah Samac: Medicago Pathology, Biotechnology, and Genomics

This year has seen the lab going in several new directions. I spent fall semester 2008 in Toulouse, France, at a research center housing about 100 scientists all focused on plant-microbe interactions. I learned the pipette-level details of mapping and cloning disease resistance genes, had wonderful French food every day, and added about 50 new birds to my European bird list. Back in the lab, Claudia Castell-Miller rejoined the group as an ARS postdoctoral scientist working on diseases of wild rice. She is collaborating with faculty in Agronomy and Plant Genetics to develop marker-assisted breeding for disease resistance in this new crop. Summer research interns extended our work on wild rice diseases by evaluating fungicide resistance in several pathogens. We are also collaborating with Ruth Dill-Macky and Carol Ishimaru to investigate bacteria causing leaf streak in small grains and wild rice. We welcomed ARS postdoctoral scientist Jamie O'Rourke to the lab, who is working on identifying transcriptional regulators of cell wall associated

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Faculty Activities *con't*

genes, in support of developing alfalfa as a bioenergy feedstock. I am trying my hand at co-editing a new edition of the *Compendium of Alfalfa Diseases and Pests* and I am also involved in a yearlong training course through USDA Graduate School to develop leadership and unit management skills. With the able assistance of Mindy Dornbusch, we continue to work on emerging alfalfa diseases such as brown root rot and *Mycoleptodiscus* crown rot, clone powdery mildew resistance genes, and identify novel genes from *Medicago truncatula* involved in disease resistance. ⇨

Carol E. Windels: Sugar Beet Pathology-NW Research and Outreach Center, Crookston

My project studies the etiology and control of *Aphanomyces cochlioides* and *Rhizoctonia solani* AG 2-2 on sugar beet roots - and the influence of rotation crops on these pathogens. Highlights of 2009 research include suppression of *Aphanomyces* root rot of sugar beet in a severely infested field 5 years after soil-application of sugar beet factory lime (a by-product of extracting sucrose from roots). Cooperator Dr. TheCan Caesar-TonThat, Research Microbiologist, USDA-ARS at Sidney, Montana, is researching soil aggregation and their microbial components in these field plots. In the Red River Valley and southern Minnesota, *R. solani* is emerging as an increasingly important pathogen of sugar beet, soybean, and edible beans and also infects corn roots without causing aboveground symptoms. Cooperative research is underway with USDA plant pathologists, Dr. Frank Martin at Salinas, CA, and Dr. Linda Hanson at Michigan State University, East Lansing, to analyze the population structure and pathogenicity of *R. solani* AG 2-2 (intraspecific groups IIIB and IV) isolates

from Minnesota, Michigan, and North Dakota. Graduate student Greg Reynolds spent his second summer at the Northwest Research and Outreach Center at Crookston conducting his M.S. research on remote sensing for detection of *Rhizoctonia* crown and root rot in sugar beet. The laboratory also received nearly 100 sugar beet samples for diagnosis of root diseases (*Aphanomyces*, *Fusarium oxysporum*, *Pythium*, *R. solani*) from May through August. Jason Brantner (Research Fellow, 1994 M.S.) is contributing excellent productivity to, and management of, the project. ⇨

Nevin Young: Legume Genomics and Evolution of Disease Resistance Genes

The past year has been a busy time for Nevin Young and his lab in the Cargill Building. One notable highlight was successfully receiving an NSF Plant Genome Research grant to create a “hapmap” for the model legume, *Medicago truncatula*. Working with Dr. Mike Sadowsky in Soil, Water and Climate, Dr. Peter Tiffin in Plant Biology, plus collaborators at the National Center for Genome Resources (NCGR), Boyce Thompson Institute, and Hamline University, Young will explore host-symbiont relationships between legumes and Rhizobia. A hapmap is a powerful new type of genetic mapping tool, similar to what is being developed in humans to discover disease-causing genes. Young and his partners will use next generation sequencing technology to discover millions of *Medicago* markers known as “SNPs” at very high resolution. These SNPs will enable the group to pinpoint genome regions that harbor genes responsible for variation in symbiosis in natural populations. Several new scientists have joined the lab to work on the hapmap project, including Plant Pathology graduate student Peng Zhou, post-doc Antoine Branca, programmer Roman Briskine, plus several undergraduate Fellows. ⇨

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**The *Aurora Sporealis* is going green!
See page 35 for details.**

