

AgExcellence 2010-2011

Montana State University College of Agriculture and
Montana Agricultural Experiment Station



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Cover photo by Lance Sorensen.

The Years 2010-2011 in Numbers

953 — number of students enrolled in the College of Agriculture in 2011, (a 19% increase since 2007). **10** — new faculty hired since 2009 (with eight searches underway). **1** — department name changed from Veterinary Molecular Biology to Immunology and Infectious Diseases. **6** — majors, minors or options added or changed since 2009 (Most notably, the Sustainable Foods and Bioenergy Systems major with four options). **150** — students (on average) graduating with a B.S., M.S. or Ph.D from the College of Agriculture each year. **354** — students who received scholarships in academic years 2010 and 2011. **247,879** — dollars given to students through College and departmental scholarships for the 2011-2012 academic year. **23,565,781** — MAES 2011 biennium budget dollars. **24,961,565** — MAES 2013 biennium budget dollars. **279** — number of new grants secured in the last two years (154 in FY2010 and 125 in FY2011). **11** — number of patents or provisional patents issued in the last two years (five in FY2010 and six in FY2011). **12** — plant varieties (spring wheat, winter wheat, barley, safflower, camelina, sainfoin) released since 2005. **20,729,656** — FY2010 research expenditure dollars. **21,994,716** — FY2011 research expenditure dollars (a 14% increase since FY09). **12** — number of new construction and renovation projects completed at Montana Agricultural Experiment Station farms, ranches and centers since 2009. **88,000** — approximate square feet of newly constructed or renovated space in the last three years at Research Centers and on and around the MSU campus!

Broader engagement sharpens the cutting edge in agriculture



Greetings! We are pleased and proud to be in your hands again, sharing some highlights from our students, staff and faculty in the College of Agriculture and the Montana Agricultural Experiment Station.

Temporary circumstances did not allow us to regularly communicate with you in 2010, so we are doing so robustly with a 2010-2011 issue of *AgExcellence*. Throughout this issue you will find new faces, new programs and stories of programs that have evolved over decades to meet new challenges and develop new technologies.

Agriculture is a key component of the Montana economy, contributing over \$3 billion, and just as importantly, agriculture is integral to our culture. Every Montana community, whether rural or urban, is connected to agriculture. Through time, Montana State University has remained highly engaged with the larger agricultural and natural resource communities in many different and innovative ways.

In the late 1800s, Montana State University was called the Agricultural College of the State of Montana. Like the name, much has changed, but much remains the same. In 1893, the Agriculture Department had eight students, all male. In 2011, the College of Agriculture has nearly 1,000 students and the ratio of male to female students is nearly 50:50. This is our fourth consecutive year of increased enrollment, with student numbers not seen since the early 1980s.

Agriculture students at MSU have the globe as their classroom, whether through technology or through direct participation in our diverse global experiences. Given the opportunity to extend their learning outside the classroom—and often outdoors—students work with our faculty and staff, teaching and learning in labs, greenhouses, farms and ranches in Montana and

all over the world. Through collaborative research experiences and by engaging with rural, urban and scientific communities, they are creating new knowledge and achieving impacts and outcomes that we could only dream about in decades past.

Our faculty competes for state, regional and national funding, acting as passionate innovators and energetic explorers of learning as we become more diverse and efficient in our agricultural operations, even better stewards of our natural resources and even more effective in developing intellectual and human capital across generations.

Looking back and more importantly, looking ahead to 2012, we will be celebrating multiple anniversaries: The Morrill Act at 150 years (Land-grant Act); USDA at 150 years; Hatch Act (ag research) at 125 years; 4H at 100 years; Linfield Hall at 105 years, and not quite the same round number, but MSU will be 119. What a blend of past achievements, future opportunities and stunning challenges for all of us in this historical legacy!

We are thankful for what we have been given, the opportunity to continue to grow and make an impact, and for the trust placed in us as we continue to move MSU to even greater heights of engagement and transformation.

All of us are privileged to be part of MSU and contribute in so many different ways to its strong past and, most importantly, to its emerging excellence across the entire academy.

Please enjoy and reflect on our achievements and impacts, as we continue to challenge students and ourselves with new endeavors. As always, we welcome feedback at agdean@montana.edu.

Jeff Jacobsen
Dean, College of Agriculture
Director, Montana Agricultural Experiment Station

BREAKING GROUND

ALL THINGS NEW

2010 and 2011 were huge years for new faces, new development and new growth in the College of Agriculture and Montana Agricultural Experiment Station. Some ground-breaking highlights include:

- The College of Agriculture leadership team has two new faces. Tracy Sterling came to MSU in August 2009 as the department head for Land Resources and Environmental Sciences. Glenn Duff began his role as department head for Animal and Range Sciences in August 2010.
- Enrollment is up for the fourth year in a row. The College of Agriculture has 100 more students in 2011 than in 2009.
- The College of Agriculture has a new team in academic programs. Nora Smith joined the College as the Assistant Dean and Jessica Murdock is the new Student Services Coordinator. They are responsible for the academic programs, student services and diversity issues in the College and its six academic departments.
- New and renovated facilities in the College of Agriculture and Montana Agricultural Experiment Station increase the capacity and capability for teaching, research and outreach.
- MSU has new leadership, too! Waded Cruzado became the 12th MSU President in January 2010 and Martha Potvin joined MSU as Provost and Vice President for Academic Affairs in January 2011.



MSU President Waded Cruzado cuts ceremonial barbed wire to celebrate the dedication of the Animal Bioscience Building, Nov. 6, 2010.

New Space for Spatial Sciences Center

“For years everybody has been talking about how we’re now in the information age,” said Rick Lawrence, a Land Resources and Environmental Sciences (LRES) professor and director of MSU’s Spatial Sciences Center, “That hasn’t changed. What has changed is that it’s no longer just the information, it’s the location of the information that has become absolutely critical.”

For example, it’s not enough to know that a certain number of acres of whitebark pine have been killed, said Lawrence, referring to a recently completed research project. If you want to manage, you need to know where the beetle-killed trees are and which trees are at risk.

Using remotely sensed imagery and climate records from a 10-year period, MSU researchers established a relationship between pine beetle mortality and climate variability. The research also noted decreasing periods between climate anomalies and beetle mortality, bearing out entomologists’ suspicions that the insect’s life cycle at high elevations seemed to be shortening.

“We can’t see the beetles from space, but we can see what they’re doing,” Lawrence said.

Whether it’s mapping beetle-killed trees, feeding data to emergency responders, monitoring geothermal activity in Yellowstone National Park, pinpointing optimal herbicide placement, or monitoring no-till practices for carbon sequestration, more and more of the research done, not only in the College of Agriculture, but university-wide, uses data collected from satellites and planes, and mapped using Geographic Information Science (GIS) and

MONTANAVIEW, an MSU-led consortium of agencies working within the state to advance the use of remotely sensed data, is also part of the Center. Coordinated by Christine Sommers Austin (LRES), the consortium includes University of Montana, Montana Tech, Salish Kootenai College, non-profit organizations and government agencies. Under the umbrella of a national organization called AmericaView—which is partially managed through MSU by Debbie Deagen (LRES)—MontanaView provides educational outreach (primarily through K-12 curriculum and workforce development) and administers a nationwide database of spatial scientists who can help first responders utilize spatial data in the event of natural disasters. **For information, visit <http://montanaview.org/>**

Global Positioning System (GPS) technologies.

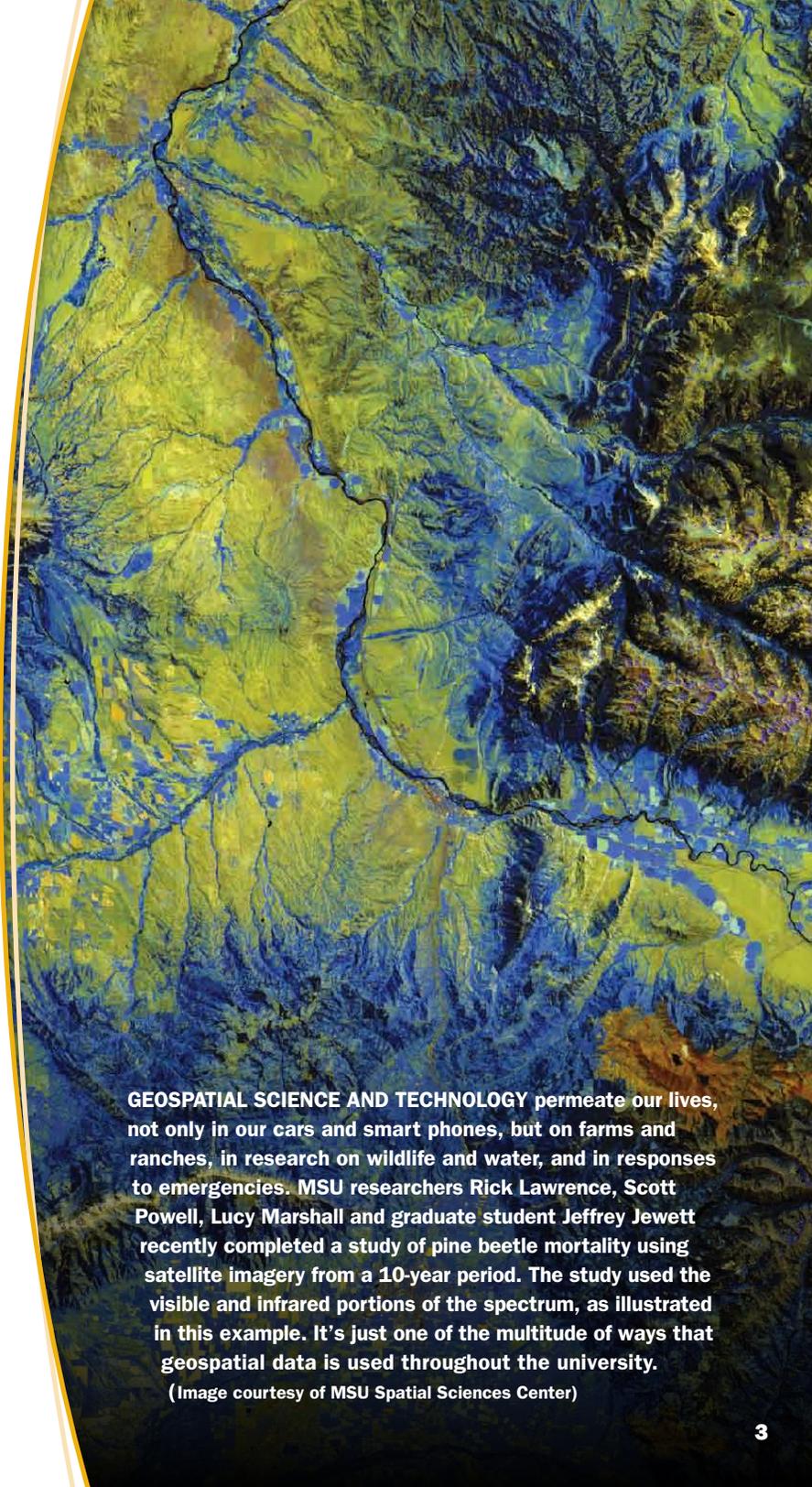
That rapid growth has created a steep increase both in research and in the need to teach students how to use GIS, GPS, and remote sensing technologies effectively. Course enrollments for spatial sciences classes at MSU increased by 19 percent in the past five years, with waiting lists for many required courses and lab facilities stretched beyond their intended use.

In 2011, the College of Agriculture allocated funds (with support from the Provost’s Office and the College of Letters and Sciences) to move the Spatial Sciences Center’s offices, classroom, and labs to larger, remodeled spaces in Leon Johnson Hall. The Center is now able to accommodate 25 percent more students in a specifically designed learning environment with lab access to state of the art equipment.

Instructors Diana Cooksey (LRES), Stuart Challender (Earth Sciences), and Lawrence have been able to increase their class enrollments and the Center has added two new courses to the nine already offered.

Geospatial technology is one of the fastest growing job markets in the U.S., said Lawrence, and the new facilities help MSU’s Spatial Sciences Center better prepare MSU students to work with the spatial data that’s integral to science today.

“Location has become key to the information age, and that’s what we do.”



GEOSPATIAL SCIENCE AND TECHNOLOGY permeate our lives, not only in our cars and smart phones, but on farms and ranches, in research on wildlife and water, and in responses to emergencies. MSU researchers Rick Lawrence, Scott Powell, Lucy Marshall and graduate student Jeffrey Jewett recently completed a study of pine beetle mortality using satellite imagery from a 10-year period. The study used the visible and infrared portions of the spectrum, as illustrated in this example. It’s just one of the multitude of ways that geospatial data is used throughout the university.

(Image courtesy of MSU Spatial Sciences Center)

STUDENT SUCCESS

WHY WE'RE HERE

Giving students tools to build their futures is at the center of what we do. In this section, meet Nora Smith, assistant dean for academic programs, get acquainted with a few students, read some of the outstanding achievements of our students and meet one or two of the teachers among the many in the College who represent our true passion for teaching.

Did you know that:

- There are 16 student clubs and organizations associated with the College of Agriculture, including Ag Ambassadors, Collegiate FFA, Horsemanship Club, Collegiate Young Farmers and Ranchers, Friends of Local Foods, and many more. Many are involved in service projects or volunteer on and off campus.
- 202 students are supported by a COA scholarship.
- College of Agriculture graduates who earned a Bachelor's degree in 2010 are earning an average salary of \$32,581. Doctorate graduates are earning an average salary of \$52,250.
- 50 percent of our 2010 graduates (who responded to the Career Destinations Survey) are employed full time in the academic field in which they graduated.
- There are 45 faculty advisors dedicated to academic advising and helping students get the most out of their college experience.



MSU students assist in a therapeutic riding program sponsored by Eagle Mount, a Bozeman-based organization that provides therapeutic recreation opportunities for people of all ages and disabilities.

Service is at the heart of the College of Agriculture



Not even a year into my new “home” here at MSU, I have been most impressed by the many ways in which College of Agriculture students connect, create, and serve. Needless to say, we have been busy around here.

Last May, the College of Agriculture commenced almost 100 baccalaureate and master’s recipients.

Our graduates spanned every department and option within the College, and helped to constitute the largest graduating class in MSU history. Our most recent alumni have, of course, fanned out across the state, the country, and even the globe, and by almost all accounts, they are happily and gainfully employed in fields related to their primary interests.

Even as we celebrated with our wonderful seniors, and lauded their accomplishments across the academic departments, we prepared to welcome the next incoming cadre. Over the course of four orientation sessions from June to August, we added 125 College of Agriculture incoming first-year and about 30 transfer students to our departments. Much like the Class of ’10, they span every option, and represent an astonishing array of interests, backgrounds, aspirations, and accomplishments. For the fourth year in a row, enrollment in the College of Agriculture has grown; we now number some 950 students in our undergraduate and graduate curricula, and the pace of our record growth may not slow for some time.

As I pull together these data, I’m reminded again how much things can change in the course of a single year. A year ago this month, I was preparing to interview for the position of Assistant Dean of Academic Programs in the College of Agriculture. I figured I was a long shot, at best; my academic background clearly wasn’t related to agricultural sciences, and I’d bounced between postsecondary and K12 settings in recent years.

Nevertheless, as I prepared my application materials, I focused on a verb buried in the job description: administer. I parsed it out in Latin: in this case, *ad ministrere*, “to serve”. Specifically, I was applying for an opportunity to serve the students of the College of Agriculture at my alma mater. While I hadn’t spent much time as an undergraduate in Linfield Hall, most of my work history related

to service. As I pored over the College of Agriculture catalog and curricula in advance of my day-long interview, I began to realize that very few academic fields are as well positioned, and as historically based, in service (and learning based on such opportunity) as MSU’s College of Agriculture.

So almost a year later, I’m happy to report that I might have the best job in the world. The students I work for and with are some of the most energetic undergraduates in the country; they’re personable, conversant, and engaging. The invisible diversity amongst our ever-increasing numbers is astonishing, and we derive such tremendous strengths in the differences in their interests, academic pursuits, and career objectives.

What has impressed me most, though, is our students’ sense of place, their connection to the surrounding environs, their abiding commitment to community. That ethos is tangible, and given the pressures put on this generation of emergent leaders, a profound expression of optimism.

As a newcomer to the Dean’s Office, I naturally prioritized getting to know the students populating our departments, a task that has proven to be a great joy. In all of the many ways that they excel, College of Agriculture students have welcomed the many new faces on campus in the past few months, including mine, with grace and good humor and genuine curiosity. The amount and capacity to which they individually and collectively step up to represent, whether it’s a Service Saturday or a Homecoming Parade or an ASMSU committee, amazes me.

So while we might single out a few of our best and brightest on the pages that follow, please consider the breadth of the brilliance of all of our students, demonstrated daily in their persistence, their work ethic, their commitment to their campus and communities, their dogged attention to detail, the thousands of hours of service that they contribute annually to Montana.

Settling into a new office is challenging on many levels, but if geography is destiny, I’ve happened upon a special gift in this position. My office is adjacent to and beneath the central stairwell in Linfield Hall. Given that location, on any given day of the week, for ten minutes each hour, the thunder of boots up and down the hallway as College of Agriculture students move between classes reminds me why I’m here, who I serve, and what MSU does best.

Nora Smith
Assistant Dean for Academic Programs

Student Honors

AWARDS FOR EXCELLENCE

Sponsored by the MSU Alumni Association and the Bozeman Chamber of Commerce, the Annual Awards for Excellence recognize 40 top seniors and their mentors. Seniors who have at least a 3.5 grade point average and have demonstrated campus leadership and community service are nominated by faculty. The students in turn select a mentor to be honored with them. Three College of Agriculture students and their mentors were recognized in 2010 and 2011, respectively.

COLLEGE OF AGRICULTURE AWARDS FOR EXCELLENCE 2011

NIKKI BAILEY, Agricultural Education and Animal Science (Mentor: Shannon Arnold - AgEd)

CARMEL JOHNSTON, Environmental Sciences-Soil and Water Science (Mentor: Linda McDonald - LRES)

JONATHAN SHEEHY, Agricultural Business and Agricultural Education (Mentor: Doug Young - AE&E emeritus)

COLLEGE OF AGRICULTURE AWARDS FOR EXCELLENCE 2010

LAURETTA HILL, Agricultural Education (Mentor: Carl Igo - AgEd)

ALEXEY KALININ, Environmental Sciences-Soil and Water Science (Mentor: Jill Davis - English)

RHIANNON SPAW (FORMERLY WILSON), Environmental Horticulture (Mentor: William Hoch - PSPP)

AWARDS AND HONORS

JOLYNN MILLER and **SHANNON ARNOLD** (AgEd) received funding to attend the National Agriculture Education conference as a result of a winning 2nd place for their poster, "Produce Your Own: A Community Gardening Program" at the 2010 Western Region Agricultural Education conference.

TERI NESS (AE&E) was named as an Outstanding Senior by the Western Agricultural Economics Association. The award recognizes outstanding undergraduate seniors who have achieved excellence in their academic endeavors and of whom much is expected of their future contribution to agriculture, resource, and/or environmental economics in the Western United States.

KATY HANSEN (AE&E) an industrial engineering/economics major, was one of two seniors winning the 2010 Torlief Aasheim Community Involvement Awards, the university's top award for student service.

BOB SAGER (A&RS) received the Outstanding Graduate Student Award at the MSU Day of Student Recognition on April 26, 2011. The award is based upon scholarship, leadership, and contributions to MSU.

NICHOLAS PERETTI (ImID) was selected as the 2011 Outstanding Graduate for the College of Agriculture and was awarded an Academic

Scholarship from Marquette University School of Dentistry in recognition of his meritorious undergraduate achievements.

ROB WATKINS (ImID) was one of 16 graduate students in the nation chosen to participate in Student on the Hill Day. Watkins, who is studying invasive bacterial pathogens, traveled to Washington, D.C. to speak with congressional leaders about the value of basic research and its relevance to human health.

KELLY SHEPARDSON (ImID) was awarded an HHMI/UW WWAMI student clerkship in summer 2011.

SARA BLOSSER (ImID) was awarded an American Heart Association two-year Pre-doctoral Fellowship titled "Mechanisms of SREBP, SrbA, mediated azole drug resistance in *Aspergillus fumigatus*."

SUSAN MEYER, ROBERT WATKINS and **TYLER NYGAARD** (ImID) received travel awards to attend the 55th Annual Wind River Prokaryotic Biology Conference, Estes Park, Colo., June, 2011.

SRISOMBAT PUTTIKAMONKUL (ImID) received the Novozymes Outstanding Student Poster Award at the 8th International *Aspergillus* meeting at Asilomar, Calif., March, 2011.

KELSEY JENCISO, JOHN MALLARD and **TYLER SMITH** (LRES) received the Outstanding Student Paper Award for

presentations at the 2010 Fall Hydrology Meeting of the American Geophysical Union in San Francisco, Calif.

TANYA SKURSKI (LRES) was awarded a Western Society of Weed Science scholarship for her thesis work with Bruce Maxwell and Lisa Rew on "Quantifying community-level impacts of spotted knapweed and downy brome."

KIM GOODWIN (LRES) was recognized by the Weed Science Society of America as best scientific paper of the year for a thesis chapter.

ALEXEY KALININ (LRES) received a National Science Foundation Research Experience for Undergraduates Fellowship.

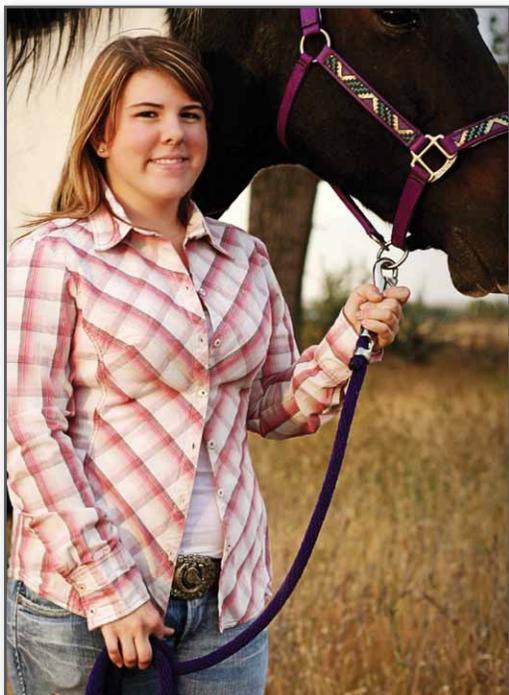
JAMES MEADOW (LRES) received the Boyd Evison Graduate Fellowship to study soil crusts near hot springs in Yellowstone National Park.

LESLIE PIPER (LRES) received a first place Student Presentation Award at the Montana American Water Resources Association annual meeting.

TANYA SKURSKI (LRES) received an award for her presentation at Weed Science Society of America.

LEE OLESEN (PSPP) was selected by the Jacobsen Company as one of 30 students in the U.S. to attend the 2011 Jacobsen Future Turf Managers' Seminar in Charlotte, NC, May, 2011.

What does being an Agriculture student mean to you?



CASSANDRA LANNEN

Cassandra is a senior in animal science from Glasgow and is a member of Alpha Zeta and Circle K.

I chose to attend MSU's College of Agriculture because it is one of the best schools in Montana. I also had a tuition waiver for any in-state college. MSU's pre-vet program is a great preparation for vet school.

I received the Harry Cockrum Memorial Scholarship, the Frank R. Beckley Scholarship, the Thomas D. Campbell Memorial Scholarship, and the Christy Foundation Grant. These scholarships have eased my stress about my financial situation and allowed me to focus more on my studies. Focusing more has allowed me to receive the grades

I have and prepare me for my future, hopefully as a rural Montana veterinarian.

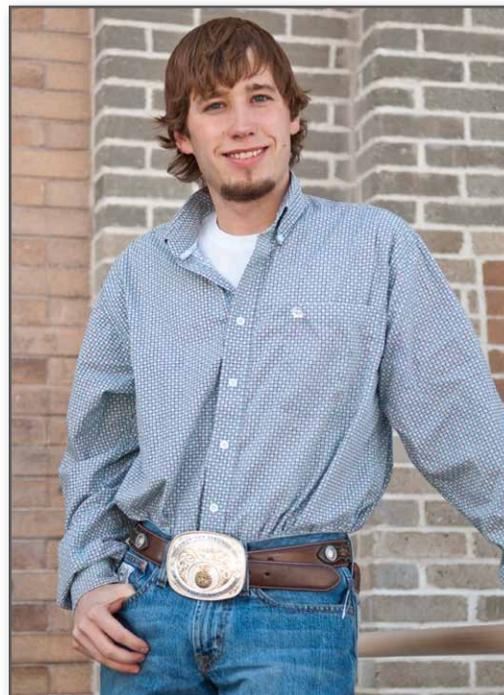
To me, being an MSU Ag student means being treated by the staff as an individual and not just a number. It also means having the preparation to be able to return to a rural area in Montana and be an important member of the agricultural community.

My most cherished memory while attending MSU is any home football game and all the memories with my friends throughout the years. My favorite MSU tradition? Cat/Griz Games!

The advice I'd give a first-year College of Ag student is, "Don't sweat the small stuff." The professors really aren't scary and most do want to help. Go to their office hours and get help if you need it and establish a good student-professor relationship. It will become very helpful in the future.

I'm looking forward to graduation and hopefully attending veterinary school next fall. I plan to continue on with my education at veterinary school.

My generation cares about agriculture because we are the ones that have to deal with the growing population of the people in the world. We need agriculture and the knowledge to be able to grow food or raise food producing animals to feed the world.



KYLE SENNER

Kyle is a senior in agricultural education from Richey, and is a member of Ag Ambassadors and Collegiate FFA.

I chose to attend MSU's College of Agriculture because I wanted to go to a school with a strong agriculture program, yet still in state. The cost was also very reasonable.

I received the George S. Severson Scholarship as well as the Sobotka Memorial Scholarship. I am so grateful to receive these scholarships. Without their help I would not have been able to attend, let alone finish college. I owe these people a great deal.

Being an Ag student is very important to me. It is a rare thing these days for someone

to stay in production agriculture, and the MSU College of Agriculture really does encourage this.

My most cherished memory while attending MSU is being in the Latex & Lace Fashion Show, an event that takes place during Sexual Health Awareness Month. About 1,000 people turned out to attend this incredibly fun event sponsored by a variety of health organizations to advocate for sexual health awareness.

My favorite MSU tradition? The Brawl of the Wild!

The advice I'd give a first-year College of Ag student is, "Go to as many events as you can, meet as many people as you can, and go to class!"

I'm looking forward to putting my major into practice. I cannot wait to actually teach in a school setting and utilize the things that I have learned. I plan on teaching agricultural education in a small rural school somewhere in eastern Montana.

My generation cares about agriculture because it is a way of life for millions of people. The backbone of this nation is still agriculture, just as it was 100 years ago. If we do not carry on that lifestyle people will begin to realize how important agriculture really is.



Sowing research, reaping teaching



If you're studying environmental horticulture at MSU, you can expect to get your hands dirty, thanks to experiential learning supported by teachers like Bill Hoch.

In five years of teaching in MSU's horticulture program, Hoch has twice been nominated by students for the President's Excellence in Teaching Award, was elected by the Horticulture Club to receive the Professor of the Year Award, and received the peer-nominated Teaching Award of Merit from the North American Colleges and Teachers of Agriculture. Last year, as a result of an award-winning student recognizing him as her mentor, he was honored with an Award for Excellence by the MSU Alumni Association and Bozeman Area Chamber of Commerce.

Hoch teaches Woody Ornamentals, Advanced Propagation and the Horticulture Senior Capstone courses. The capstone course is a team or individualized research project that spans two semesters. It's both a synthesis of undergraduate education and a transition between undergraduate and postgraduate work, said Hoch.

In the fall, Hoch guides capstone students in selecting project ideas and writing proposals.

"I want them to do something that they're interested in," he explained, "About half the time they come up with their own ideas. Then we kind of massage it into a good, workable research plan," he said.

The students are expected to plan their study, but Hoch says he encourages them to start their research

before the snow flies. After any outdoor research, they continue with greenhouse work and write reports in the spring. At the end, students give an in-class presentation similar to a research report.

Hoch's involvement in research keeps him abreast of opportunities for student excellence.

He is working on developing sterile varieties of popular ornamentals, such as Russian Olive and Spirea, which are either off the market or in the process of being banned, due to their invasive characteristics. He's also involved in USDA-funded research, developing new varieties of street trees to increase urban diversity. (Emerald ash borer, a pest expected to decimate urban ash trees in the next decade, is one obvious reason for such work.) Hoch also collaborated with Norm Weeden at MSU to construct a genetic map of *Viburnum*, an ornamental he has studied since his undergrad days.

In one case, Hoch is continuing research that began as a student capstone project. His student, Carmen Backes, was the first to develop a clonal propagation system for *Castilleja* (Indian Paintbrush), a difficult plant to propagate because it parasitizes the roots of surrounding plants. Backes' work was published in a peer reviewed journal, and Hoch is currently completing research steps so the plant may be grown for commercial and restoration ecology purposes.

Another student, Rhiannon Spaw, attributes her career as a plant propagator to Hoch's guidance. Spaw said he encouraged her to get involved in the Undergraduate Scholars Program with Spirea research and informed her of a nursery internship which helped her get a job right after graduation. (Spaw happens also to have been the 4.0 scholar who shared the honor of her 2010 Award of Excellence by identifying Hoch as her mentor.)

"Everybody calls him Bill and jokes around, but at the same time, they really respect him as an excellent plantsman," said Spaw.

As horticulture programs in many institutions struggle, MSU's program is going strong. The combined programs of horticulture science and landscape design account for a large student base in the College of Agriculture. Excellent job placement numbers show MSU horticulture students going on to a variety of careers, including greenhouse production, nursery production, forest service and other interests.

ABOVE: Indian Paintbrush was part of an MSU capstone project, the results of which were published by Carmen Backes and Bill Hoch. **RIGHT:** Hoch is pictured with a microscope used for plant tissue culture. (Photos courtesy of Bill Hoch)

Exploring sustainable decision-making for both the land and its people

Cliff Montagne is a product of the Greater Yellowstone Bioregion. The son of an MSU geology professor, he spent his youth tagging along on field expeditions, wrangling horses in the Gallatin Canyon and racing through snow covered mountains on cross country skis.

His first teaching experience was guiding pack trip guests on the 320 Ranch. Then, during his graduate studies in geology and soils at MSU, he began coaching high school, MSU, and eventually U.S. regional nordic ski teams.

He credits his teaching success to the kinds of things he learned as a coach: guiding a group of young people, helping them achieve their potential, keeping everybody warm, excited and motivated. Montagne still trains and races at the World Master's level "as a healthy way to maintain personal sustainability," as he puts it.

Sustainability, Montagne explained, is the idea that if we want our human enterprises to be long-lasting, they need to be sustainable environmentally, socially and financially. That big-picture way of thinking has been the theme of his MSU career. From his beginnings as a TA teaching Soils, to the Holistic Thought and Management class that he teaches today, Montagne has been one of the driving forces in taking MSU's Land Resources and Environmental Sciences (LRES) programs to the cutting edge of sustainable thinking.

"Students in LRES programs become aware that their environmental science solutions must also consider social and financial realities," said Montagne.

After becoming acquainted with natural processes starting with the soil, some students get hands-on holistic management training by working with

rural communities in Mongolia, Japan, Mali and on Native American reservations through programs that Montagne and other College of Agriculture faculty have developed.

"I hope that I've been able to help lots of students become aware of working with natural processes and how we as humans and decision-makers can interface in a positive way with nature," said Montagne.

Retiring this year, Montagne will continue teaching part time, and will remain involved in the MSU BioRegions Program, through which he leads students to Mongolia in service learning projects.

"Support from the Mansfield Center to spend a year in Japan launched my international activities," said Montagne. Now he shares that spark with a new generation of students.

Among his rewards as a professor, Montagne counts lasting friendships, and the satisfaction of connecting with the students who come from Montana agriculture and then bring a wider perspective back home. Degree holders from MSU's LRES program are working in some of the most important natural resource management entities in Montana and elsewhere, he said.

He also counts his development at MSU as rewarding: "I have had freedom to figure out my professional direction and I've always had colleagues who expressed interest and support," said Montagne. "I think that says a lot about the broad-mindedness of the College and the Department and speaks to MSU's role of providing education: that the students come first."

In addition to teaching, Montagne directs the MSU BioRegions Program, a University-centered action research, experiential education and service learning organization that brings students and faculty back and forth between Montana and Mongolia to work on community partnerships in support of environmental quality, education, health and traditional knowledge and skills. He also chairs the MSU Campus Sustainability Advisory Council, charged with providing a framework to coordinate and advise sustainability efforts on a campus-wide basis.



Cliff Montagne shows a Mongolian bridle and a horsehair rope purchased from host community members. Mongolian herders traditionally use this type of rope to secure the circumference of a ger (Mongolian yurt). (Photo courtesy of BioRegions Program)

DEPARTMENT HIGHLIGHTS

This section recognizes some of the notable research, teaching and outreach efforts of our departments during 2010 and 2011.

The Division of Agricultural Education (Ag Ed) serves as a link between the College of Agriculture, the several secondary agricultural education programs such as the traditional vocational agricultural training, FFA, 4-H, and the Extension Service.

RECOGNIZING EXCELLENCE

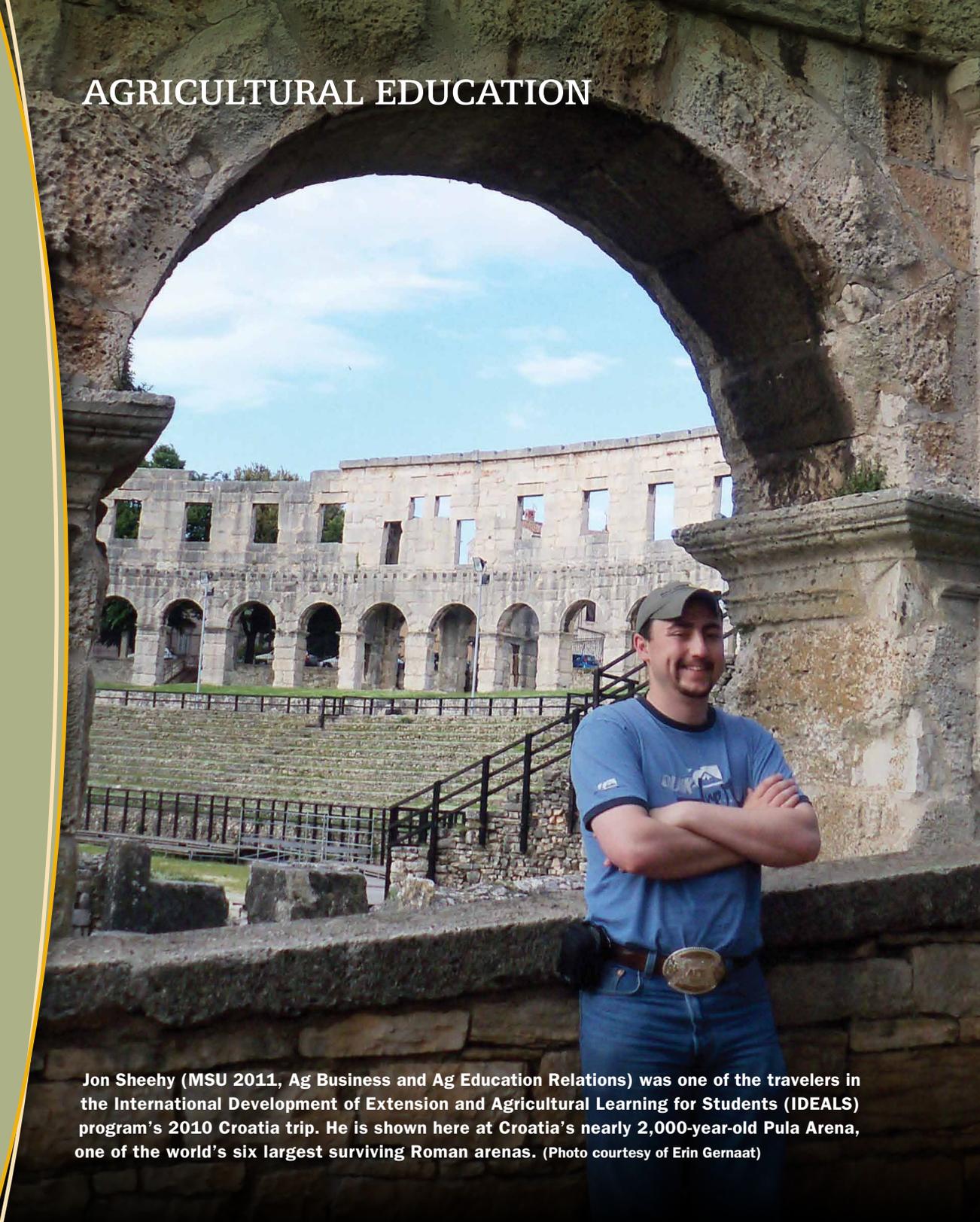
SHANNON ARNOLD received a Western Region Outstanding Young Member award from the American Association for Agricultural Education in 2011.

CARL IGO received the Distinguished Teaching Award from the Western Region of the American Association for Agricultural Education in 2010. Igo also received the Distinguished Service Award from the Montana FFA Association in 2010.

MARTIN FRICK'S article, "Enhancing Effectiveness of Extension Efforts: A Case Study of Malian Shea Butter Producers," was first runner up in the Best Article Award competition by Journal of International Agricultural and Extension Education. This was awarded at the 2010 Association for International Agricultural and Extension Education Conference in Saskatoon, Saskatchewan.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)

AGRICULTURAL EDUCATION



Jon Sheehy (MSU 2011, Ag Business and Ag Education Relations) was one of the travelers in the International Development of Extension and Agricultural Learning for Students (IDEALS) program's 2010 Croatia trip. He is shown here at Croatia's nearly 2,000-year-old Pula Arena, one of the world's six largest surviving Roman arenas. (Photo courtesy of Erin Gernaat)

Collaborations in Croatia lead to international learning experiences for MSU Ag students

Since he first went to Croatia to help the recovering country establish agricultural cooperatives 10 years ago, Marty Frick has been to Croatia 22 times. But what began as an effort to boot-strap a war ravaged farm economy has blossomed into an international exchange that can help MSU students gain valuable perspective on agribusiness issues at home.

It started in 1998, when MSU hosted Croat farmers on tours of Montana. Frick, an Agricultural Education professor, made his first trip to Croatia in 2001 and in subsequent years received several grants, including a 2005 Fulbright scholarship. He taught cooperative marketing there, and helped the University of Zagreb establish a cooperative business curriculum similar to that taught at MSU. In 2009, he served as one of the inaugural Fulbright Ambassadors in the nation.

Most recently, Frick contributed curriculum analysis expertise to help Croatia's universities comply with the Bologna Accords, which are an effort to institute more compatible education systems throughout Europe. He shared the system that he and his colleagues developed to evaluate outcome expectations for prerequisite courses so that students transferring from two-year colleges and Tribal Colleges can enter MSU's Agricultural Education program with better chances of success.

But one of his most rewarding experiences so far, said Frick, was leading the first five MSU Agriculture students on a two-week educational tour of Croatia in the summer of 2010. With support from the Montana Farm Bureau Federation and the CHS Foundation, students spent two packed weeks touring farms and agribusinesses and meeting officials, managers and producers throughout Croatia.

From rural hometowns as far flung as Big Sandy, Conrad, Fort Benton and Terry, the students flew to Zagreb, the historic capital of the Mediterranean country, and saw for themselves how Croat farmers grow and market familiar crops like beef and grain, and those less familiar, such as olives.

"Students can more objectively see things when they go to a place other than their own," Frick said.

Jon Sheehy, a group member who grew up on a cattle ranch in Big Sandy and graduated from MSU in 2011, said he was surprised that much of Croatian agriculture was very similar to Montana's agriculture.

"For a person studying Ag Economics, it wasn't necessarily differences in technology or operations that stood out, but in government involvement," said Sheehy. "The scope of those government programs and the effect that they're having on Croat producers was pretty interesting." For example, he noted, when the group visited a Croatian feedlot, it looked about the same as any feedlot, but the fact that bulls, rather than steers, were being fed there indicated that Croats were more focused on poundage than American producers, who receive more quality-based incentives.

"Subsidies and incentives are aligned differently there," said Sheehy.

Another Croatia tour member, Erin Gernaat, of Conrad, documented the entire trip in a blog, from the home-made pie sale that she masterminded to raise travel money, to the markets, ag operations, foods, cultural sites, scenery and good times she encountered along the way. Her "Cruising Through Croatia" blog is at <http://eringernaat.blogspot.com>



Online delivery of Research course lets place-bound students start grad studies

If you live in Sidney, Montana and want to pursue a master's in agricultural education, the commute to MSU is 826 miles, round trip. That's an unreasonable commute, even in good weather. But online courses can make it possible for students to earn degrees without leaving their livelihoods.

As a first step in establishing the ability to deliver an online agricultural education master's degree program, Carl Igo began teaching the AGED 506, Research Methods, course fully online, beginning in 2008. The Research Methods course, offered each fall, is required for all Masters students and serves as a foundation for their graduate research experience.

Now, thanks to online course delivery, place-bound students can earn that Masters degree without pulling up stakes. Last fall, all but two of the students enrolled in the Research Methods class were working full time and only three were in Gallatin County, said Igo.

Students who take the course come from various backgrounds. This fall, an MSU Extension agent in Sidney, an NRCS employee in Ravalli County, a student in Colorado and two from Gallatin County took the course. Last fall, students included an agriculture teacher in California, two MSU Extension agents in central Montana, and an MSU adjunct faculty member.

"Even if the course were offered as an evening course, most of these students would not be able to make a weekly trip to Bozeman," said Igo. Also, by offering the course online, with presentations and discussion forums available 24-7, students can work the course around their work and family schedules.

"The biggest challenge is the lack of face time," said Igo. To balance this distance learning obstacle, students explore difficult concepts, ask questions and discuss ideas on discussion boards.

The positive side of that coin is that some of the students' biggest breakthroughs are captured within the discussion forum, said Igo.

"Just like teaching a face-to-face course, the reward comes when I can tell students are struggling to understand, then have a break-through and 'get it,'" he said.

"In their first semester of a graduate program, students are often intimidated by the prospect of undertaking a research project, and think reading and critiquing research is boring.

"Then, when that light-bulb comes on, they get passionate about a research problem and about getting a research proposal ready to send to a graduate committee."

ABOVE: From his office in Linfield Hall, Carl Igo participates in discussion boards to keep in touch with students in the distance delivered Research Methods class. (Photo by Meggan Carrigg Davidson)

AGRICULTURAL ECONOMICS & ECONOMICS

The Department of Agricultural Economics and Economics (AE&E) offers a unique opportunity for students with diverse interests to learn skills in critical analysis, logical problem solving, data and policy analysis, written and oral communication and business management.

RECOGNIZING EXCELLENCE

JANE BOYD, Student Services administrative assistant, was selected as the College of Agriculture Student Council's Friend of the Student award in 2010 for her organization, dedication, and knowledge, and willingness to exceed expectations to help faculty and students be successful.

GARY BRESTER was named the Western Agricultural Economics Association Distinguished Scholar in 2011.

DAVID BUSCHENA was selected for the 2010 College of Agriculture Student Council's Outstanding Faculty award for his passion for teaching and his commitment to helping students.

MARSHA A. GOETTING received the Continued Excellence Service Award from the National Extension Association of 4-H Agents in 2010.

DUANE GRIFFITH received the 2010 Western Extension Director's Award of Excellence for multistate programming, which is the highest honor that can be received from the Western Extension Directors Association. Griffith also received MSU's Excellence in Outreach Award in 2011.

DOMINIC PARKER and **TERRY ANDERSON** were awarded the Addington Prize in Measurement by Canada's leading public policy think-tank, the Fraser Institute, in 2011 for their paper, "Sovereignty, Credible Commitments, and Economic Prosperity on American Indian Reservations."

WENDY STOCK was presented the 2010 James and Mary Ross Provost's Award for Excellence for excellence in teaching and scholarship.

CHRISTIANA STODDARD received MSU's Cox Family Faculty Excellence Award in 2011.

VINCE SMITH received the USDA Bruce Gardner Award in 2011 for his original research on the agricultural crop insurance industry and his other contributions to policy analysis.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)



Park County High students participate in the 2011 Economics Challenge, cosponsored by the Montana Council for Economic Education. As well as hosting the challenge event for students, the nonprofit MCEE distributes free economics teaching materials and hosts webinars, workshops and classes, many of which are taught by MSU Department of Ag Econ & Econ professors. (Photo courtesy of MCEE)

MSU experts help high school teachers give their students fundamentals in economics

Few high school teachers in Montana have backgrounds in economics, but through the Montana Council for Economic Education (MCEE), they can receive training, support and curriculum materials developed by experts to help them teach the subject well.

The MCEE, a nonprofit education foundation housed in MSU's College of Agriculture and headed by Connie Genger, was organized 40 years ago to help Montana educators teach economics. Starting with Professor Terry Anderson (now retired) and continuing over the years with the involvement of Professors Myles Watts, Randy Rucker, Vince Smith and many others, MSU's Department of Agricultural Economics and Economics assists MCEE with teacher workshops, curriculum materials, and even occasional classroom guest lectures.

Watts, who teaches agricultural economics to MSU students, has been involved in MCEE for about 10 years, teaching educator workshops, developing curriculum, and serving on MCEE's executive committee.

One example of a curriculum unit that Watts collaborated on is "Bananas in Montana," which deals with comparative advantage in international trade by asking students the question, "Why don't we grow bananas in Montana?"

The curriculum is designed to teach Montana kids using examples that they can relate to. That might be the bananas at the local store, the price of gas in their car, or the mining, forestry, farming, ranching and ecology activities that their parents may be involved in.

"It's not like teaching math," said Watts. "Math is the same in New York City as in Bozeman, Montana, but the economic examples in Montana are different."

In addition to using relevant examples, the Council focuses on key economics topics that are the most difficult to teach, said Watts. An advisory board of teachers called the Montana Economic Education Leaders (MEEL) keeps the Council in touch with teacher needs and gives feedback about what teaching approaches work best in their classrooms.

Julie Hanson, a teacher who uses MCEE curriculum materials at the junior high level in White Sulphur Springs (and also serves on MEEL) said the curriculum breaks the topics down enough that economics isn't overwhelming for the kids.

"We try to limit ourselves to a few topics," said Watts, but to cover those topics so that students really get them. For example, students see the idea of incentives from several different angles, so they become proficient in thinking about it and applying it to their lives.

"Whatever we can do to help in teaching efforts so that students can be more effective citizens and understand the world in which they live, that's what we're really talking about here," said Watts.

"In the end, economics is the study of the allocation of scarce resources. We have scarce resources everywhere. In our personal lives, in our businesses, in our government – every place we look."

About 100 high schools in Montana, and some in surrounding states, use at least part of MCEE's freely distributed economics curriculum. The MCEE also puts on an average of 12 teacher trainings throughout the year, ranging from one-day workshops to masters-level credit courses, as well as putting on an annual Economics Challenge event, which gives student teams a chance to try their economics wits. Top honors in the 2011 Economics Challenge went to the Park High Eagles team, coached by Livingston teacher, John Feckanin.



New faces in agricultural economics and economics

His third floor office in Linfield Hall may appear bare, but when agricultural economist, Eric Belasco arrived in June of 2011, he brought plenty with him.

Belasco, newly settled in MSU's Department of Agricultural Economics and Economics as an assistant professor, arrived brimming with expertise that can shed light on profitability for beef producers, examine new possibilities for specialty crop producers and even

improve the accessibility of healthcare in remote rural areas.

"I'm interested in a lot of things," said Belasco.

His graduate research focused on how best to reach residents in rural Texas with cancer prevention education.

Then, early in his PhD work at North Carolina State University, Belasco discovered his interest in agricultural trade and policy issues. He went on to receive the Kenneth R. Keller Award for Excellence in Doctoral Dissertation Research for his study of economic risks in fed cattle production. His papers on quality risk and profitability in cattle production have appeared in *The Journal of Agriculture and Resource Economics* and other publications.

Most recently, Belasco was an agricultural economist at Texas Tech. In addition to teaching, he was part of a multidisciplinary team studying the economic feasibility of high tunnel cropping systems and organic mulches for specialty crop growers. Belasco's role was to pencil out the viability of the new cropping techniques with data from research plots in Washington, Tennessee and Texas. His research compares the upfront and maintenance costs of these techniques to advantages such as lengthened growing season, protection against extreme weather conditions and ultimately, higher crop yields.

Looking forward to teaching Advanced Marketing at MSU in Spring of 2012, Belasco is currently meeting folks in the community and soaking up knowledge about Montana's unique agricultural industries. Ag Appreciation Weekend 2011 was his first chance to address Montana producers with insights on risk management in the beef industry. He discussed his current research, which evaluates the effectiveness of weather derivative insurance products and index-based insurance products.

The variables in reaching a profitable bottom line in agriculture are complex, and Belasco and his colleagues are all about staying on top of them.

Belasco is one of three new assistant professors hired in the Department of Agricultural Economics and Economics in 2010 and 2011. Other newest members of the faculty include Mark Anderson, whose expertise is in applied microeconomics, health economics, risky behavior and crime; and Jason Percy, whose expertise is in industrial organization, applied microeconomics, applied econometrics, environmental and energy economics.

ABOVE: Eric Belasco, Agricultural Economist. (Photo courtesy of Eric Belasco)

ANIMAL & RANGE SCIENCES

The Department of Animal and Range Sciences (A&RS) focuses on the scholarly pursuit of science and technology supporting livestock, rangeland, and other renewable natural resources in economically profitable, ecologically sustainable, and socially acceptable systems.

RECOGNIZING EXCELLENCE

JAMES BERARDINELLI received the 2010 Mershon Award, presented by the Montana Academy of Sciences for Scientific Excellence, Advancement of Science Education in Montana, and Service to the Montana Academy of Science.

PEGGY KELLEY was honored with an MSU Employee Recognition Award in 2010.

RODNEY KOTT was honored for his 30 years of service as an MSU Extension Sheep Specialist, awarded during Extension's 2010 Annual Conference in Bozeman.

SHANNON MOREAUX received the BIVI Equine Industry Leadership Award and the National Award for Equine Educational Seminars in 2010.

JOHN PATERSON received the Western Section American Society of Animal Science (WSASAS) Distinguished Service Award at the WSASAS meeting in Miles City, MT in 2011. The award is the highest award that Western Section gives and is in recognition for John's service to the beef industry.

MIKE TESS received the Beef Improvement Federation's (BIF) 2010 Continuing Service Award presented at their annual meeting in Columbia, MO.

TOM WOLFE, MSU Farrier School Director, was inducted into the International Horseshoeing Hall of Fame in 2011 for his contributions to Farrier Education.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)



Researchers are studying the potential of using sheep to reduce tillage intensity in organic cropping systems. (Photo by John Paterson)

Can sheep bring sustainability and profits to organic dryland farming? Integrated farming systems the latest in sheep grazing studies.

Studying sheep in targeted grazing programs is nothing new at MSU. Since the early 1980s, when MSU researchers began to look at the feasibility of sheep grazing as a tool in the control of noxious weeds, a successive series of studies has proven that sheep grazing can be a viable option in range weed management.

More recently, MSU studies that compared sheep-grazing to mechanical and chemical means of managing crop residue and fallow showed that grazing held its own with popular no-till practices for soil moisture conservation, weed control and even crop yield. It also shows promise for controlling wheat stem sawfly and alfalfa weevil.

“The most rewarding thing is the potential of a win/win partnership,” said Patrick Hatfield, referring to the sheep’s potential to save money for crop managers while making money for sheep producers.

Hatfield, a professor of animal and range sciences, is building on the momentum of previous studies and ready to learn more about how sheep fit into sustainable agriculture. He and an interdisciplinary team of MSU researchers just received a \$743,000 USDA grant to conduct a 3-year study on how sheep can be used to decrease tillage intensity in organic cropping systems.

Organic dryland farmers are currently in something of a sustainability Catch 22. Since herbicides can’t be used in organic farming, ultimately organic farmers till to manage weeds and terminate cover crops.

The problem is that in dryland situations, tillage is associated with soil erosion, not to mention higher greenhouse gas emissions and fuel inputs, none of which paint a rosy sustainability picture, explained Fabian Menalled, an associate professor of weed ecology and management, and one of Hatfield’s team members.

Their study will examine the potential of sheep grazing in organic cropping systems to reduce tillage intensity, nitrogen leaching and greenhouse gas emission and increase soil fertility and soil carbon sequestration. Another facet of the study will examine the use of weeds, cover crops and crop residues as feed inputs for sheep fiber and meat production. The study will also assess production, social and economic challenges facing organic crop producers.

Integrating sheep into dryland farming is integrating the MSU campus, too. The research team includes experts in animal and range science, soil science, soil chemistry, ecology, agroecology, weed ecology, agricultural economics, community development and educational evaluation.

The project will also offer undergraduate learning opportunities in soil conservation, carbon sequestration, sustainable cropping systems, agricultural economics and a new Livestock in Sustainable Production Systems class.



Wildlife Habitat Improvement course puts student boots on the ground on a real ranch

Tent camping on two sections near the Judith Mountains is about as far from a PowerPoint presentation as you can get, and that’s just fine with the students in Clayton Marlow’s Wildlife Habitat Improvement field course.

In the intensive week-long field course, students get to apply their studies in natural resource ecology and wildlife and livestock habitat, thanks to the cooperation of a landowner who has hosted the field course since Marlow created it in 2008.

“The best thing is that it’s a hands-on class,” said Latrice Tatsey, a senior in rangeland ecology who took the 2011 course. “You’re actually out in the field, dealing with a real situation and practicing everything you’ve learned from your freshman to your junior or senior year.”

The students’ task, in this case, is to help the landowner achieve his goal of creating a world-class upland bird hunting opportunity on the ranch. They are assigned to create a management plan outlining goals, strategies, measures and actions to help enhance the bird habitat and overall environmental stability of the ranch while ensuring that the plan is economically feasible and ecologically and socially acceptable.

At the ranch, students receive guest lectures on wildlife biology, soil science and weed control, and hear the perspectives of the landowner and neighboring ranchers. In groups, they locate sampling areas and measure wildlife populations, plant communities, food plot production and habitat utilization — as well as conducting range and forest condition surveys. After evaluating their data, the groups make recommendations.

One plan is selected to present via teleconference to the landowner, who offers feedback and questions before the plan is finalized.

The landowner, Gary Martin, has diligently implemented the majority of the recommendations that the class makes each year. For example, following recommendations from the 2010 class, he began leased grazing on his property to lower wildfire risk and accelerate the incorporation of organic matter into the soil.

By revisiting the ranch each year, students get to do some forensic natural resources work. They review the previous year’s management plan, evaluate outcomes and learn from the performance of work that preceded them. Over the past three years, students have noted that sharptail grouse numbers depend on the viability of native woody draws, while gray or Hungarian partridge do better with access to safflower and sunflower seeded food plots, said Marlow.

Working with a landowner who has specific management objectives, but who wants to do the right thing with his property, is a powerful learning tool, said Marlow.

“When you’re managing, you have to do what’s best for the landowner, but you also want to maintain a healthy and stable ecosystem,” said Tatsey, “Taking this class helped me really learn how to balance the two.”

ABOVE: Students in MSU’s Wildlife Habitat Improvement field course sample plant communities on a privately owned ranch near the Judith Mountains. (Photo courtesy of Clayton Marlow)

The Department of Immunology and Infectious Diseases (ImID) uniquely combines expertise in the study of pathogen biology, host defense, cell biology and use of small and large animal models for understanding infectious disease pathogenesis and host defense mechanisms.

RECOGNIZING EXCELLENCE

MICHELE HARDY was awarded a Lifetime Membership from the American Society for Virology for hosting the 29th Annual Meeting in 2010.

ALLEN HARMSEN received MSU's Meritorious Technology/Science Award in 2011.

MARK JUTILA received MSU's Meritorious Technology/Science Award in 2011.

JOSHUA OBAR was awarded a Research Scholar Development Award from the National Institutes of Health.

Obar also received a Junior Faculty Travel Award from the American Society for Immunology to attend the 98th Annual AAI Meeting in San Francisco, CA on May 13-17, 2011.

DAVID PASCUAL was named an Affiliate Associate Professor of Immunology, University of Washington School of Medicine in 2010.

MARK QUINN was elected to the National Council of the Society for Leukocyte Biology for a 4-year term (2012-2015).

JOVANKA VOYICH-KANE received the WWAMI Medical Program Lucille Logan Excellence in Service Award in 2010.

Voyich also received the WWAMI Medical Program Excellence in Education and Intellectual Growth of Future Physicians in 2010.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)



Jovanka Voyich-Kane samples bacteria from the nose of Luna, her German shepherd. Through BioScience Montana, Voyich will involve teens in a learning module that focuses on infectious diseases in humans and animals. Other BioScience Montana modules cover neuroscience and how the brain works; and metabolomics – the connections between eating, exercise and overall health. Partners on the grant include Montana 4-H, MSU Extended University, and the MSU departments of Immunology and Infectious Diseases, Chemistry, and Cell Biology and Neuroscience. Find out more at <http://eu.montana.edu/bioscience> (Photo by Meggan Carrigg Davidson)

Engaging Montana youth in university research through BioScience Montana

A new federally funded project will help 4-H teens in Montana learn about health-related careers and studies. Jovanka Voyich-Kane, a researcher in Immunology and Infectious Diseases, is one of the three MSU faculty members who will share her science with the youth participants.

The project, called BioScience Montana, is funded through the National Institute of Health's SEPA (Science Education Partnership Awards) program. Its goal is to help rural teens in Montana learn more about career options in the health sciences, and to help communities better understand the importance of clinical research.

Starting in August of 2012, MSU faculty and students will connect with 4-H participants over the course of a year. Using a combination of distance and face-to-face learning, project leaders plan to keep the teens engaged far beyond a one-time campus visit. Working in small community-based teams, the 4-H'ers will visit the MSU campus for a BioScience Week that includes hands-on research. Then—upon returning to their home communities—they'll conduct scientific experiments and research. All the while, they'll maintain contact with MSU and with one another via videoconferencing, social networking and other technology tools.

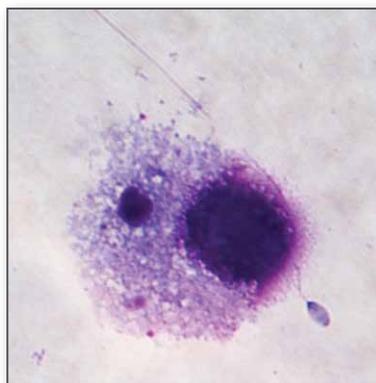
Voyich, whose current research at MSU focuses on why emerging strains of methicillin-resistant *Staphylococcus aureus* (MRSA) are infecting healthy communities, will lead a three-month module that focuses on infectious diseases in humans and animals, including coverage of Montana researchers' work on West Nile virus.

"I'll introduce them to the idea that humans and mammals are really super-organisms made up of our own cells and those of millions of microbes," said Voyich. Kids are usually quite surprised to learn that their bodies have 10 times as many bacterial cells as they do human cells, she said.

In Voyich's unit, the teens will learn what an infection is and how to differentiate normal microbiota from something that could be infectious. They'll learn to isolate single bacteria from a complex mix and use MSU's lab facilities as they learn to identify bacterial culprits through a progression of activities. After the campus experience, the students will be challenged to go home and examine bacterial samples from an animal's nose, maybe even their own 4-H dog, cat, horse or cow.

Voyich, who is also a science, technology, engineering and mathematics (STEM) mentor and an active participant in youth outreach education efforts in partnership with Montana Tech, said that BioScience Montana is the first of its kind for her, in terms of the magnitude of immersion for the students.

"This is a really unique opportunity. The students are at MSU for a week learning fundamental laboratory skills to take back home, then they'll be interacting with us through technology connections so this will be a long-term project," she said.



Studies of fungal pathogens in bees can help Montana beekeepers keep healthier hives

Colony collapse disorder (CCD) continues to devastate honey bee colonies in the USA, and researchers all over the country are working together to identify the cause. As they explore whether a bacteria, fungi, virus, parasite, or a co-infection of more than one pathogen is to blame for the disappearance of entire colonies, the resulting research can help beekeepers develop management techniques to raise healthier bees.

Robert Cramer, an MSU assistant professor who is known for his study of fungal pathogens that cause disease in humans, became interested in studying bee diseases when he heard that the microsporidia, *Nosema apis* and *N. ceranae* were suspects in the colony collapse mystery.

"*Nosema* are fascinating from a biological perspective," said Cramer, explaining that their spores enter the bee's cells through a unique needle-like structure called the polar filament, then rapidly multiply within the cell, causing the cell to burst.

Cramer first started collaborating with Prof. Jerry Bromenshenk, a University of Montana biology research professor and widely known bee scientist, to survey the incidence of *Nosema* infection among Montana honeybees in 2007. They found that the majority of the hives they studied were infected. Collapse or no collapse, the fungus was a cause of unhealthy bees, which can have significant economic impacts for beekeepers.

Recently, Cramer's research team worked with Bromenshenk and the U.S. Army on a project using proteomics technology to study the viruses and fungi most frequently found in declining bee colonies. A co-infection by bee viruses and *Nosema* was noted, and the research team is now characterizing

the viruses and *Nosema* that were detected.

While continuing to examine the possible big picture effects of viral and fungal co-infections in honeybees, the team is focusing in the short-term on making the most of their *Nosema* research for Montana beekeepers. Cramer's team is looking at exactly how the microsporidia infect the bees, and addressing the question of how beekeepers can best manage to control the fungus.

Beekeepers have traditionally tried a variety of methods to manage fungal infections, said Cramer, such as treating the hives with an antimicrobial agent called Fumagilin-B or applying more experimental approaches such as the use of essential oils before moving or overwintering the bees in the fall. Treating equipment with household chemicals like bleach is another practice that could help remove fungal spores from equipment and prevent disease spread. By setting up controlled experiments, researchers in MSU's Cramer Lab will be able to provide science-based answers on what works best.

The lab is also able to quantify how much of the microsporidia is present in specimens they receive from beekeepers, using a DNA-based technique called PCR. The beekeepers can then make management decisions based on the level of infection.

ABOVE: A cell culture image shows a *Nosema* spore (ovoid at bottom right) with the polar tube extruded near the insect host cell. (Image by Peggy Lehmann courtesy of MSU Cramer Lab)

The Department of Land Resources and Environmental Sciences (LRES) focuses on understanding natural and managed landscapes, with fundamental and applied investigations in environmental sciences, agriculture, natural resources, and land management through research, teaching and outreach activities.

RECOGNIZING EXCELLENCE

CHRISTINE FOREMAN was awarded an Outstanding Faculty Award from the MSU Center for Biofilm Engineering in 2011.

KIM GOODWIN, RICK ENGEL and **DAVID WEAVER** were recognized by the Weed Science Society of America for their paper in *Invasive Plant Science and Management*, "Trained Dogs Outperform Human Surveyors in the Detection of Rare Spotted Knapweed (*Centaurea stoebe*)."

RICK LAWRENCE was recognized by the American Indian Research Opportunities Program in 2010.

KEVIN O'NEILL was awarded the President's Excellence in Teaching Award in 2010.

BRIAN MCGLYNN was named to the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Science.

MERRY PACELEY was honored with an MSU Employee Recognition Award in 2011.

BOB PETERSON received the Editor's Choice Award for Outstanding Paper of the Year, Entomological Society of America.

JOHN PRISCU was named a Fellow of the American Geophysical Union in 2010.

LISA REW received the Teaching Award of Merit from the North American Colleges and Teachers of Agriculture.

TRACY STERLING was named a Fellow of the Western Society of Weed Science in 2010.

CATHY ZABINSKI was recognized with MSU's Women's Faculty Caucus Distinguished Mentor Award in 2011.

(More recognitions are listed in *Student Honors*, p. 6 and in *AgExcellence Around the World*, p. 24)



With cable ties in her mouth, post-doctoral research associate Casey Delphia prepares a wood nesting block to provide nesting sites for bees during a study of native pollinators on local farms. There are over 4,400 described bee species native to North America, and Delphia is learning more about those found in Montana. (Photo by Genna Boland)

Study looks at native pollinator populations on small commercial farms in Montana

Casey Delphia is blow drying bees. She's not running an apian beauty salon at Marsh Labs. It's because catching bees in bright yellow bowls of soapy water mats down their many branching hairs, making them difficult to identify.

Delphia, an MSU post-doctoral research associate, is in the midst of a two-year study that has her scrutinizing veins on bees' wings—even the size and shape of their tongues—in an effort to characterize the biodiversity of Montana pollinators.

Worldwide declines in native bee populations and threats like colony collapse disorder in honey bees have ignited an explosion in pollinator studies, said Delphia. In Montana, it's hard to know for sure if native bees are in trouble, since little is known about them, she added.

A 2010-2012 MSU study, made possible by Natural Resources Conservation Service funds distributed by Pollinator Partnership, will increase that knowledge baseline. It's a first step toward developing effective strategies for native bee conservation by understanding their requirements in different types of agricultural ecosystems, said Delphia.

Along with entomology professor Kevin O'Neill, Delphia is identifying and comparing samples of bees collected on small, diversified farms (such as those that sell local produce), on MSU research farms focused on small grains production, and at plant nurseries. In the study's first year, she collected more than 50 species from nearly 2,500 specimens in bowl traps alone. She also uses nesting blocks and nets to collect a wider variety of bees.

For some crops, like tomato and squash, native bees are better pollinators than European honeybees, explained Delphia.

"Pollination is crucial," she said. "If you eat a hamburger, you likely have pollinators to thank," noting that three quarters of flowering plants—including alfalfa forage for cattle—need pollinators to reproduce.

This isn't the first bee study in Montana. But it provides another piece of the puzzle, said O'Neill, who has led several studies over the last 10 years.

"We've worked with bees on seed farms, in the mountains and in rangeland areas. This is a different picture because it's small scale commercial agriculture."

In collaboration with Pollinator Partnership and Scott Prajzner (Ohio State University), Delphia and O'Neill also developed a fact sheet that identifies 10 types of bees commonly seen in Montana.

The Montana Bee Identification Guide is online at: <http://pollinator.org/beeguides.htm>

Crow Education Partnership builds a two-way pipeline between MSU and Crow schools

Fourth graders at three schools in the Hardin School District may start out envisioning scientists as goggle-eyed men in white coats, but after a year of hands-on learning, the scientists they picture are ordinary people who love to learn—and who look a lot like them.

Beginning in 2009, Land Resources and Environmental Sciences faculty, graduate students, post-docs and staff have worked with 200 students and nine teachers through the Crow Education Partnership, which brings monthly science opportunities to enthusiastic learners: teachers and students alike.

MSU Educational Outreach Specialist Susan Kelly collaborates with the Crow Education Department and MSU scientists to help teachers on the Crow Reservation create lessons that make science come alive for kids. Topics range from climate literacy to some of the hottest and coldest subjects that LRES researchers are studying, including the biology and ecology of life in the Polar Regions and in Yellowstone National Park.

The partnership started when Kelly asked reservation teachers what kind of help they wanted. She continues to work closely with teachers that serve Native American students; MSU Tribal Liaison, Bill Yellowtail; and Crow Education Department members like Janine Pease and Jennifer Flatlip to develop lessons that are interesting and inviting to Crow kids.

Christine Foreman, an associate research professor who studies microbial communities in the Arctic and Antarctic, is one of the scientists involved. She offers first-hand scientific context by sharing her research with teachers, and Kelly helps her and others translate their science into fun enrichment activities for kids.

"Being able to convey your passion for a subject," said Foreman, and seeing the teachers' excitement, are some of the things she loves about the program.

In October of 2011, the Partnership worked with the Crow Education Department to put on a Climate Literacy Workshop that brought in 47 teachers from the surrounding rural communities for two activity-packed days.

In the "blubber glove" activity, kids explore the specialized adaptations of polar bears and penguins by plunging their hands into cold water with and without the insulation of a glove filled with Crisco. Another unit shows kids how Native Americans were the first scientists in the Yellowstone bioregion.

Graduate students in the LRES program have helped with everything from classroom teaching to serving kids tacos during a campus visit. It gives them a little experience with teaching in a culturally sensitive way, said Kelly. Plus, the kids can look at the grad students and say, "Hey, that could be me."



ABOVE: A Hardin 4th grader checks out the type of mitten that MSU researchers use on Polar expeditions. In addition to monthly classroom activities and professional development opportunities for teachers on the Crow Reservation, last year the Crow Education Partnership brought 150 4th graders and teachers from the Hardin Intermediate School to the MSU campus, and coordinated Yellowstone Park field trips for two school groups. The 100% grant-funded Partnership received support from NASA, NSF, Gordon and Betty Moore Foundation and the American Honda Foundation. (Photo courtesy of the Crow Education Partnership)

PLANT SCIENCES & PLANT PATHOLOGY

The Department of Plant Sciences and Plant Pathology (PSP) programs develop and promote an understanding of plant biology and associated microbes from the molecular to the population level, and the processes and interactions involved in plant-based biological systems.

RECOGNIZING EXCELLENCE

TRACY DOUGHER received the North American Colleges and Teachers of Agriculture Teacher Fellow Award in 2011.

BILL HOCH received a Teaching Award of Merit from the North American Colleges and Teachers of Agriculture in 2010.

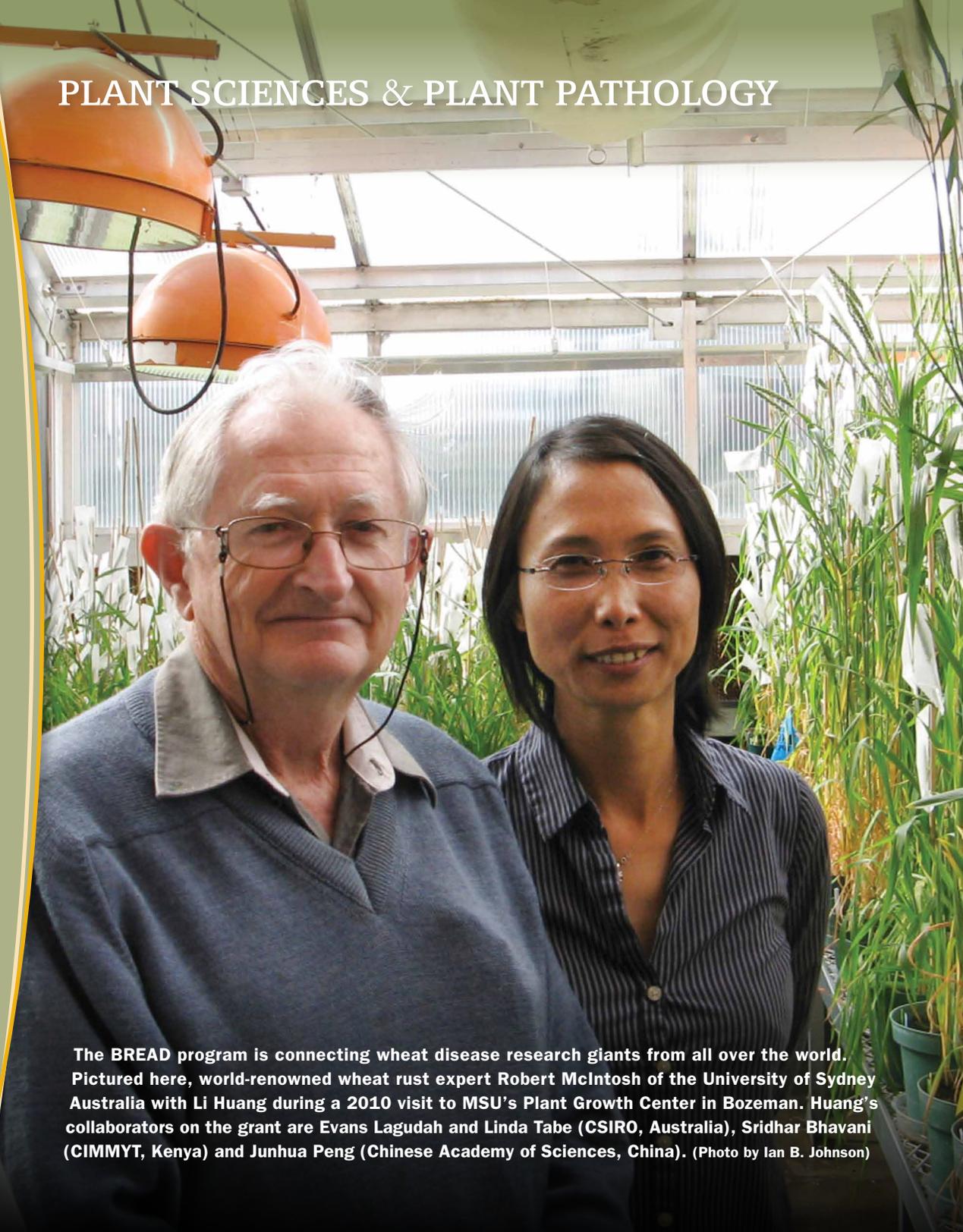
BARRY JACOBSEN was awarded a Fulbright Fellowship to teach a graduate course, Plant Disease Management, and a workshop in Biological Control at Austral University, Valdivia, Chile.

LUTHER TALBERT received the MSU Cox Faculty Award for Creative Scholarship and Teaching in 2010.

MARK YOUNG received the 2011 MSU Meritorious Technology/Science Award.

MEMBERS OF BARLEY, WHEAT, POTATO, AND TOMATO COORDINATED AGRICULTURAL PROJECTS funded by the National Institute of Food and Agriculture of USDA received awards from the Secretary of Agriculture in recognition of their scientific discoveries and their translation into beneficial agricultural products. Jamie Sherman, Tom Blake and Luther Talbert were all recipients of the Secretary's Honor Award.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)



The BREAD program is connecting wheat disease research giants from all over the world. Pictured here, world-renowned wheat rust expert Robert McIntosh of the University of Sydney Australia with Li Huang during a 2010 visit to MSU's Plant Growth Center in Bozeman. Huang's collaborators on the grant are Evans Lagudah and Linda Tabe (CSIRO, Australia), Sridhar Bhavani (CIMMYT, Kenya) and Junhua Peng (Chinese Academy of Sciences, China). (Photo by Ian B. Johnson)

Wheat researchers working to help feed the world with help from NSF and Gates

Plant researcher Li Huang can tell you a little about Bill Gates, but not as much as she can tell you about wheat rust resistance. Huang met with Gates when she and an international team of researchers discussed their rust disease resistance project with Gates and other leaders at the annual meeting of the BREAD Program last July.

BREAD, a new program co-funded by the National Science Foundation and the Bill and Melinda Gates Foundation, stands for Basic Research to Enable Agricultural Development. Grants distributed through the program promote fundamental research that directly impacts agriculture in the developing world.

In 2010, Huang and a team of four collaborators from Africa, Australia and China were among the first 15 teams in the world to receive BREAD program grants. They received \$1.32 million over three years to study why some rust resistance genes are suppressed in the wheat genome. As breeders worldwide are working to fight new strains of wheat rust, the team's ultimate goal is to use a new molecular tool to revive the usefulness of elite wheat cultivars that have become susceptible to rust.

The team started with material from a wheat mutagenized population developed by MSU researcher Mike Giroux, and during the study's first year, they were able to locate a resistance suppressor gene to a specific chromosome. Over the next two years, they will work to identify which DNA sequence is responsible for suppressing rust resistance.

"If we can understand the sequence of this suppressor we can target just that sequence in the good cultivar, design a construct to remove the resistance suppressor, and this cultivar could be able to be used again," Huang explained.

If the resistance suppressor were pinpointed and inactivated, resistant cultivars could be developed in about one fifth of the time it takes to add resistance and maintain all desirable traits of a cultivar using traditional breeding methods, said Huang, because it wouldn't be a blind search in mixed bag of good and undesirable genetic traits.

Huang said that when her group presented their progress at the 2011 BREAD meeting in Seattle, Gates expressed great interest in why wheat possesses genes that suppress disease resistance genes, and how EMS mutants—where the chemical ethyl methanesulfonate (EMS) is used to cause changes in DNA sequence of plants—are not GMOs.

In addition to funding research that Huang and her team members are passionate about, the BREAD program provides international collaboration between researchers and students. In 2010, MSU hosted the first collaborator meeting and worked with visiting doctoral students from China and Kenya for three months. In Fall of 2011, Huang and MSU doctoral student Jackie Campbell attended the collaborator meeting at CSIRO, Australia, where Campbell remained for a one-month exchange.

For more information on this BREAD grant, visit nsf.gov/awardsearch/showAward.do?AwardNumber=0965429

Montana Master Gardener programs cultivate gardening knowledge in record numbers

Since the mid 1970s, Master Gardener programs have been a popular outreach strategy for state Extension systems. The programs provide training to amateur horticulturists, who then enhance their community's gardening knowledge by teaching and facilitating gardening-related activities as volunteers.

"We teach you, and you give back by volunteering," is the basic idea, said Toby Day, who became MSU Extension's associate horticulture specialist in 2009.

When Day undertook the charge of horticulture outreach, he identified MSU's existing Master Gardener system as a great way to spread knowledge. But distance, sparse population and limited resources have always made it tricky to teach the classes and steward volunteer resources throughout the state.

A former Silver Bow County MSU Extension agent himself, Day implemented new ideas to grow the program and make it more efficient for MSU Extension agents to administer in their home counties. Day travels throughout the state as time allows, but he also records lectures for distance learning, so that agents can schedule community classes to fit their busy schedules. He's also streamlining administrative tasks, such as tracking volunteer hours, using online tools.

The format of Master Gardener classes is more attractive to different levels of learners now. Instead of one class that combines all levels, the program now offers three levels. Master Gardeners completing the courses receive certificates and shirts that signify their level of horticulture education: Yellow shirts for beginners, green for advanced, and purple to signify the highest level.

The program has nearly doubled in size, now offering classes in 28 Montana counties. Community momentum is increasing, too, with more focus on the number of volunteer hours that Master Gardeners are asked to commit. Beginners are asked to volunteer 20 hours a year, intermediates 30, and the most advanced gardeners are asked to devote 40.

Volunteer activities range from manning information booths at farmers markets to taking part in community gardens and beautification projects, to teaching classes. The Master Gardeners can also participate in special events, field trips and an annual celebration which honors outstanding Master Gardeners.

The fact that the program has made horticulture education accessible to more than 2,000 gardeners of varying experience levels over the past two years is just part of the take-away. Day hopes the program has a broader impact.

"A gardening course might be an urban person's first introduction to MSU Extension resources," he said, "and being involved in horticulture can give people an interest and a greater appreciation of agriculture all over the state."



ABOVE: Master Gardener Jeanne McCormick and other students graft tomato seedlings during a Level 3 Master Gardener training at the Plant Growth Center, Montana State University. (Photo courtesy of Toby Day)

The Department of Research Centers addresses the practical problems of agricultural production and resource management through programs of basic and applied research, with the emphasis on application.

RECOGNIZING EXCELLENCE

CHENGCI CHEN was nominated and elected President-Elect for 2012 of the Western Society of Crop Science. Chen was also elected secretary for the S-1041 Science and Engineering for Biobased Economy for 2012 and will be advanced to president-elect next year to organize the annual meeting in 2013.

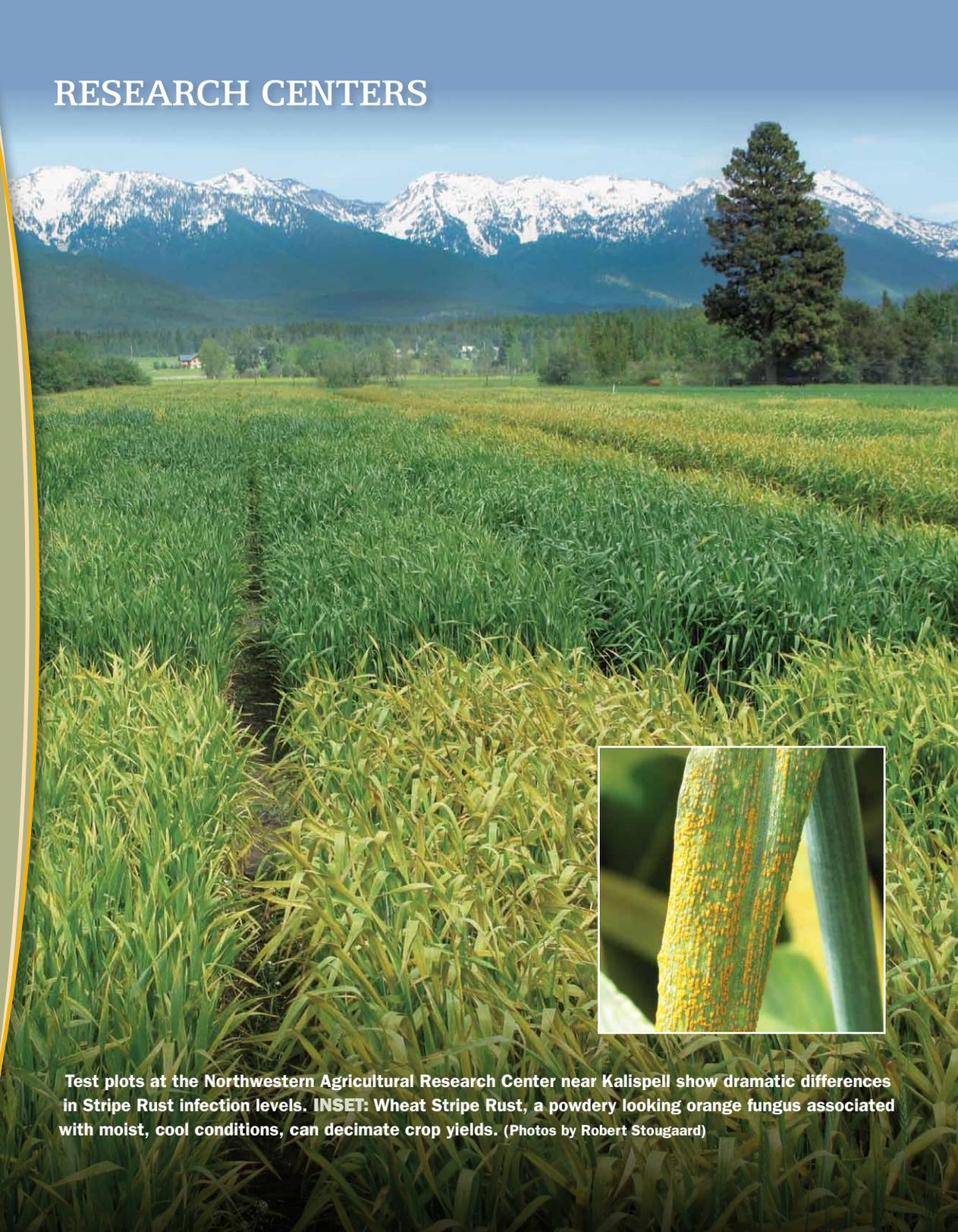
PRASHANT JHA was recognized at the General Session of the Weed Science Society of America Annual meeting at Portland, OR, for taking the initiative and lead role on behalf of WSSA IWM and Resistance Management committee to conduct a much needed symposium (half-day long) on Herbicide Resistance with invited speakers from US, Canada, and Australia.

JERALD BERGMAN was chosen as an Honorary member of the Board of Directors of Richland Economic Development Corporation.

HANS-HENNING MUENDEL and **JERALD BERGMAN** (EARC-Sidney) authored an invited Safflower Breeding chapter for the "Oil Crop Breeding" book, published by Springer.

(More recognitions are listed in Student Honors, p. 6 and in AgExcellence Around the World, p. 24)

RESEARCH CENTERS



Test plots at the Northwestern Agricultural Research Center near Kalispell show dramatic differences in Stripe Rust infection levels. **INSET:** Wheat Stripe Rust, a powdery looking orange fungus associated with moist, cool conditions, can decimate crop yields. (Photos by Robert Stougaard)

Northwestern Research Center uses Stripe Rust outbreak to study the enemy

The Northwestern Agricultural Research Center (NWARC) in Kalispell had an opportunity to study the enemy in 2011, when stripe rust infection levels reached 90 percent in both winter and spring wheat. When the fungus showed up in the intrastate winter wheat nursery being grown at NWARC, MSU agronomist Bob Stougaard publicized the news and alerted the general manager at the local CHS cooperative, who sent out a text message to quickly alert growers in the area to the presence of the yield-crushing fungus.

Stripe rust is a recurring pest problem in northwestern Montana, said Stougaard. The last major outbreak occurred in 2005 when the disease resulted in winter wheat yield losses of up to 90 percent. Awareness of the 2011 outbreak helped growers take quick action to scout their fields for signs of rust and respond with fungicide applications if necessary.

Stougaard took advantage of the high level of infection in 2011 to determine which wheat varieties were resistant to the disease and document the extent to which stripe rust impacts wheat yield and grain quality. He observed that some wheat varieties that had previously been resistant were now showing signs of infection.

“Varietal resistance is a moving target because new races of the disease can develop or be introduced into an area,” said Stougaard, “That’s why we monitor varieties for presence of the disease each year.”

Stougaard also evaluated fungicides for the control of stripe rust in different winter wheat varieties. He tested three fungicides on seven different varieties of wheat for rust infection level, yield, and grain quality.

His research showed that yields for even the most rust resistant wheat variety studied (*Yellowstone*) increased by 31 bushels per acre with fungicide application. Yield of the least resistant variety studied (*Decade*) increased by as much as 59 bushels per acre when treated. But the overall yield of *Decade*, even treated with the most effective fungicide, was still 64 bushels per acre lower than fungicide-treated *Yellowstone*.

“Usually stripe rust can be managed by either growing a resistant variety or by making a timely fungicide application. With the disease pressure so high this year, it took both tactics to get good yields,” said Stougaard.

Armed with knowledge of variety yields, wheat prices and treatment costs, Northwest Montana growers can use Stougaard’s research to help make selection decisions, judge whether to treat with a fungicide and select the most effective fungicide for the variety they’ve planted, next time stripe rust comes around.

Summaries of the 2011 NWARC studies of yield losses associated with wheat stripe rust and of effect of variety and fungicide on winter wheat yield are available at: <http://ag.montana.edu/nwarc>

Online Agronomy Decision Tools provide farmers easy access to hot crop research

Which variety to plant is one of the crucial management decisions that can make or break a grower’s profitability. To help with such key decisions, experts at MSU’s research centers generate comparisons of grain varieties based on field trials, but in the past, the results of these trials weren’t available at the touch of a button.

That’s all changed. Thanks to web tools designed to make the process simpler, comparing cultivars, choosing fertilizers and even selecting herbicides is probably easier than updating your Facebook page.

Kent McVay, Extension Cropping Systems Specialist at MSU’s Southern Agricultural Research Center (SARC) in Huntley, developed a database-driven website for variety selection in wheat, barley, peas, lentils and camelina. Beginning with winter wheat in Spring of 2008, he introduced the system to help users easily find results of trials near where they farm.

“Working with and talking with farmers all winter long at meetings and in summer field days has really taught me that they want answers quick and to the point,” said McVay. “I wanted to get our data into the producer’s hands as quickly as we have the results. And I wanted to give them the power to make their own comparisons by allowing them to merge locations of results that they felt meant something to their own operations.”

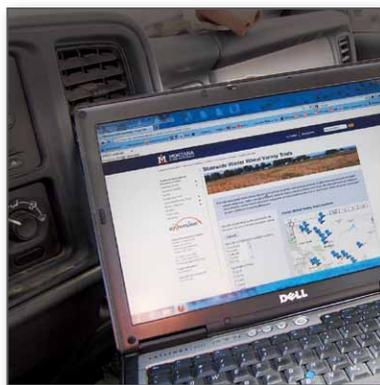
With the online tools McVay created, users can review varieties by their choice of traits and display selections based on field trial research in a matter of a just a few clicks.

McVay also built a web-tool for generating an MSU fertilizer recommendation from a soil test report and a herbicide selection tool that uses data from herbicide labels to narrow the choices a producer needs to make for rotation restrictions, particular weed control and current crop.

Producers can filter information quickly, at their own convenience. Since McVay rolled out the tools, thousands of users have accessed them, and he’s continued to improve their usability.

Alex Smith, who has been growing small grains near Fort Smith for more than 30 years, said he uses MSU’s SARC site for everything from weather news to crop horizon reports and herbicide selection tools.

“They’re accessible,” said Smith. “If you’re out in the field and you have internet access, you can jump on the internet and you don’t have to get in the truck and drive 18 miles home to access your files.”



ABOVE: A laptop computer perched on the seat of a pickup truck displays SARC agronomy decision tools. The agronomy decision tools and variety selection tools are available at the Southern Ag Research Center website. www.sarc.montana.edu (Photo courtesy of Kent McVay)

AG EXCELLENCE AROUND THE WORLD

LEARNING WITHOUT BORDERS

Montana State University researchers, teachers, staff and students are exploring agricultural science and sharing learning all over the world.

From our students who travel to trade perspectives with people in Mongolia, Croatia, Africa, and elsewhere—to our scientists who collaborate in global research partnerships—to our MSU experts who share their environmental and economic insight with the U.S. government, there are no borders when it comes to the discovery of knowledge.

This section recognizes just a few of the many activities that MSU scholars took part in around the world during 2010 and 2011.



Florence Dunkel (PSPP, director of MSU's Virtual Teaching and Learning Center for Alleviating World Poverty and Valuing Traditional Ecological Wealth) with Hawa Coulibaly, president of the Women's Association in the village of Sanambele, Mali. Collaborating with community members like Coulibaly, Dunkel and students use the holistic process to explore solutions for agricultural, economic, and community health concerns, such as malaria and kwashiorkor. Since 2000, 34 students have engaged with Malian communities, supported by USDA NIFA grants and MSU's Undergraduate Scholars Program.

(Photo courtesy of Florence Dunkel)

ANTON BEKKERMAN (AE&E) was named the Agriculture and Applied Economics Association Foundation 2010 Heading South Award winner. As the winner of the award, Bekkerman received funding to present his paper, “Don’t Compensate, Mitigate: Welfare Impacts of Check-off Programs for Wind-Borne Diseases in the U.S.” at the 2010 AARES conference in Adelaide, Australia.



credit for America’s farmers, ranchers, rural homeowners, businesses and communities. The board generally meets six times a year in Washington, D.C., to address a variety of issues relating to lending practices and policies.

JANE ANN BOLES (A&RS) was an invited speaker at the New Zealand Institute of Food Science and Technology where she presented “Natural Curing of Meat Products.”

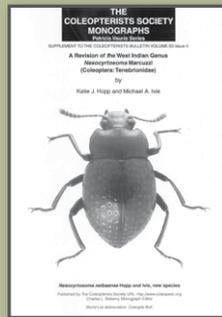
DENNIS CASH (A&RS) was invited to attend the INIA forage and livestock researchers tour of southern Patagonia (South America). The itinerary included site visits of forage research at Kampenaiké and three private ranches in distinct ecological zones of the mainland and Tierra del Fuego.

DENNIS CASH (A&RS) was awarded the “Liupanshan Mountain Friendship Award” from the Ningxia Hui Autonomous Region Government, China in 2010. Dennis was awarded this for his work on the UN-FAO alfalfa project 2007-2009.

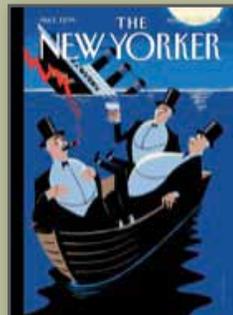
JEFF MOSLEY (A&RS) was an invited participant at the White House Conference on America’s Great Outdoors led by the Secretary of Agriculture, Secretary of Interior, EPA Administrator and the Chair of the Council on Environmental Quality. President Obama

addressed the conference and senior administration officials gathered input from participants to help the Obama administration shape its conservation strategy.

SHANNON MOREAUX (A&RS) was an invited speaker at the June 2010 Australian Equine Science Society Conference. He traveled to Gold Coast, Queensland, Australia to present two research papers titled: “Psyllium lowers blood glucose and insulin in horses” and “Radiographic interpretation of the equine digit.”



Patricia Vaurie Monograph in Coleopterists Bulletin 63 Supplement: 1-138.



Africa to collaborate on potato pathogens research. Dr. Jacobsen and Dr. Theodore Asiimwe will work on identification and integrated management of strains of *Ralstonia solanaceum* (bacterial wilt) affecting potatoes and other crops in Rwanda.

CLIFF MONTAGNE (LRES) Received the Governor’s Award for service to community development by the Governor of Hovsgol Province, Darhad Valley,

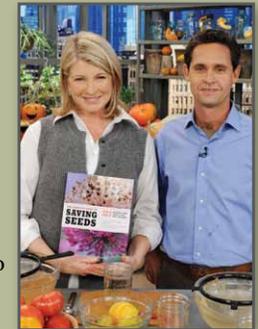
KATIE HOPP (PSPP Alumna, 2008) won the J. Gordon Edwards Prize for the world’s best scientific paper based on a master’s degree thesis about the biology and evolution of beetles. Her paper, “A Revision of the West Indian genus *Nesocyrtosoma* Marcuzzi (Coleoptera: Tenebrionidae)” was published as the 2009

FLORENCE DUNKEL (PSPP) was featured in the article “Grub: Eating bugs to save the planet,” by Dana Goodyear in the Aug. 15 and 22 issue of the *New Yorker* magazine, 2011.

BARRY JACOBSEN (PSPP) was awarded a Borlaug grant from USDA which funds scientists from the U.S. and

Mongolia in 2010. Montagne was also recognized for service in support of public health by the medical practitioners of Darhad Valley, Mongolia.

CHERYL MOORE-GOUGH (PSPP) was interviewed live on the Martha Stewart Radio Network and Stewart featured “The Complete Guide to Saving Seeds,” the most recent book Moore-Gough authored with her late husband, on a television segment. Each studio audience member received a copy of the book.



EMILY RINDOS (CIPM, LRES) appeared in the Telly award winning documentary web video, “Playing Smart Against Invasive Species: How to Enjoy and Protect the Great Outdoors.” The video can be viewed on the Forest Service Invasive Species Program website at <http://www.fs.fed.us/invasivespecies/>

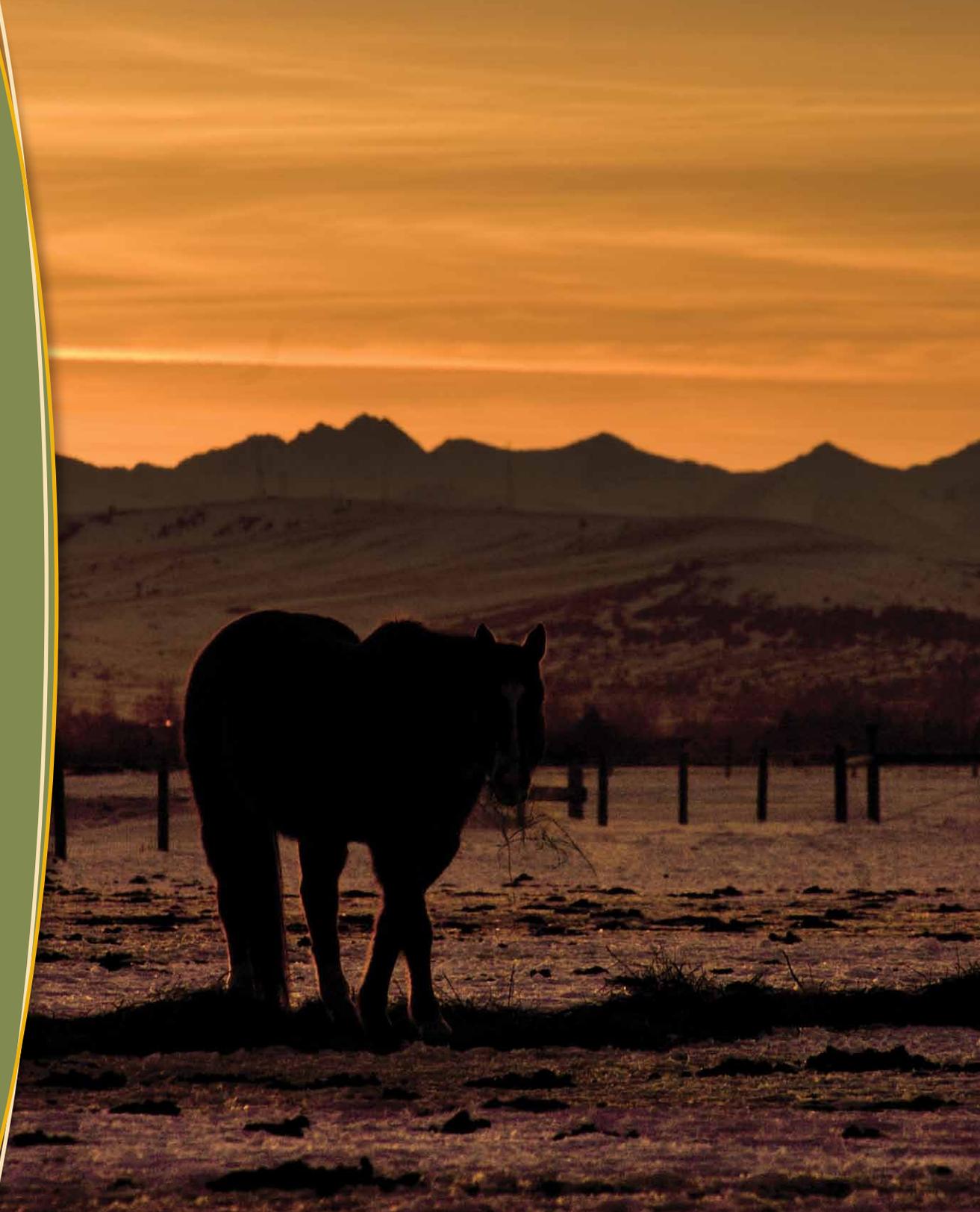
CHENGCI CHEN, KARNES NEILL and **DAVID BUSCHENA** (CARC-Moccasin) presented “Cropping systems including pea and lentil for sustainable production in Central Montana, USA” at the 5th International Food Legume Research Conference and 7th European Conference on Grain Legume in Antalya, Turkey, April, 2010.

CHENGCI CHEN and **KARNES NEILL** (CARC-Moccasin) presented “Rotational benefit and economic return of fall-seeded pea and lentil as cover crops in wheat-based no-till cropping systems” at the 5th World Congress on Conservation Agriculture and 3rd Farming System Design Conference, in Brisbane, Australia, Sept. 2011.

RECOGNIZING CONTRIBUTIONS

PEOPLE WHO MAKE A DIFFERENCE

It takes more than bricks and mortar to create an environment that ignites discovery and exploration, yet sustains connections between the many diverse individuals who live and breathe agriculture in Montana. The following articles touch on the contributions of just a few of the wonderful people who have provided vision, leadership and passion that makes MSU's College of Agriculture and the Montana Agricultural Experiment Station much more than just a school or research operation.



Outstanding Ag Leaders

The Outstanding Ag Leader Award is a statewide award given to individuals or couples who are well-respected in the agricultural community, with accomplishments that impact many; have a lifetime of achievement in agriculture; are industry leaders or upcoming innovative producers; and are actively involved in the agricultural community in Montana. The 2011 Outstanding Ag Leaders are Diana Alkire, Dan Lake and Richard Owen.

DIANA ALKIRE is the Executive Secretary and CFO at the Montana Farm Bureau Federation in Bozeman. Diana is passionate about horses and has worked tirelessly to support the equine program at MSU. She also works with Montana 4-H and FFA.

DAN LAKE is a small grain and potato seed farmer at his family farm, Lake Seed Inc./ Lake Glacier View Farm, in Ronan. Dan serves on the Montana Agricultural Experiment Station State Advisory Council and the President's Advisory Council.

RICHARD OWEN is a small grain and specialty crop farmer from Geraldine. Richard is on the CHS Board of Directors, which oversees the diversified energy, grains, foods and business solutions company. Richard serves on the College of Agriculture Academic Advisory Committee and works to promote agricultural cooperatives.

Academic Advisory Council

The Academic Advisory Council (AAC) is comprised of ten citizen members including Bob Sager, Brent Poppe, Richard Owen, Janice Mattson, Kent Watson, Dave Phillips, Mike Wilson, Barbara Landgraf Gibbons, Gerald Landby, and Robert Bargatze.

The AAC was convened by Professor Robert Gough, associate dean of the College of Agriculture in February, 2010. Dr. Gough charged the AAC "to serve as a sounding board for ideas advanced by the College and stakeholders, and to provide information, feedback, and guidance on the College of Agriculture's academic programs, curricula, courses and internships."

Each council member represents a segment of Montana's agricultural industry and a department within the College of Agriculture, and continues to work with Nora Smith, assistant dean for academic programs.

This AAC assists the College's senior administrators and faculty with service to state constituencies as part of the Morrill II mission to meet the changing needs of Montana. The Council has convened six quarterly meetings since February 2010 to analyze needs of agricultural employers and compare those needs with the education and training received by College of Agriculture graduates to identify knowledge gaps or educational deficiencies.

The Council has recommended that the College of Agriculture develop an Agricultural Management Program (AMP) to address the need for management training that allows students to marry scientific knowledge with enterprise management techniques in their careers. The College is continuing to evaluate the viability of his program.

Brent Poppe
Chair, Academic Advisory Council

MAES Advisory Council

As a fifth generation farmer growing up in the beautiful state of Montana, it became very evident to me at a young age the value and the benefits of agricultural research. During those long summers on the farm, I had the privileged opportunity to observe, learn, and interact with the researchers from our local Agricultural Research Center in Conrad. Every spring they would arrive with their plot drills, seed, fertilizer, and box lunches to plant another cycle of small grain variety and fertility test plots. The results from these test plots, which were planted within eyesight of my great-grandparents homestead, soon proved to be an essential component of the future of our Montana farm and livelihoods.

Many crop years passed before I sadly learned that I wasn't the only farm kid with his own soil scientist doing research on his farm. There is a tight knit network of seven Agricultural Research Centers, the main MSU campus and numerous on-farm plots strategically located throughout the State. The research that is performed at the various locations is grass roots driven. There is a long list of dedicated volunteers who serve on their local advisory committees and the Montana Agricultural Experiment Station (MAES) Council. Their mission is to provide valuable input that ensures that the research being performed is relevant and required by our industry. This results in unbiased and accurate information that can be utilized by producers to improve their own operations.

These are exciting times in agriculture. The same acre of land today produces three times the crop it did when my great grandfather tilled it with his horse and plow. We are being asked to increase our productivity every year to feed the hungry world. By 2050 the world population is estimated to be at 9 billion people. Without the existence of a progressive research program, this will not be possible. We have to be willing to embrace, encourage and implement technology that can make our farms more productive and efficient. Thankfully the Montana Agricultural Experiment Station is and has been in the forefront of the solutions.

Research is not only about increasing production, but also creating lifelong friendships. The friends we make and the people we are influenced by can determine the paths we take in life. Fortunately my path led me to Montana State University and the College of Agriculture. The doors that have opened and all of the close friends I have made because of my involvement in agriculture cannot be understated. While you are traveling our beautiful agricultural state, I encourage you to stop by one of the many research centers to meet the dedicated and friendly scientists who make this all happen. While you are there, take a first hand look at where research has been and where it is going in the exciting world of agriculture.

Keven Bradley, Chair, MAES Advisory Council
Agricultural Operations Technology, 1993

SUSTAINING OUR EFFORTS

STRONG ROOTS TO THRIVE

Despite the difficult global economy, the College of Agriculture and the Montana Agricultural Experiment Station are grateful for the past and present and optimistic about the future.

We have been fortunate to have incredibly generous friends. These friends have donated to scholarship programs, research programs and building projects that not only contribute to current successes, but place us at the edge of a new frontier of research prominence and student engagement.

As we welcome more and more students while changing and adding programs to meet their needs, the support of our friends becomes even more critical. Together, we'll meet the challenges of the years ahead and keep Montana agriculture strong and competitive.

In this section, we name those friends who have been faithful supporters in 2010 and 2011, highlight the story of one scholarship donor and provide the opportunity for you to make the difference in a student's life by contributing to scholarship endowment, the Robert E. "Dr. Bob" Gough Memorial scholarship.



Miss Montana Rodeo 2010, Jourdan Han, carries the American flag for the national anthem at the conclusion of the Animal Bioscience Building dedication program, Nov. 6, 2010.

Students, teachers, and you, are precious natural resources



The College of Agriculture is a cornerstone of Montana State University and its land-grant mission, a fact of which we are very proud. Our success and impact are not possible without your help. The Animal Bioscience Building has been operational for a year now; what an accomplishment within the College of Agriculture!

The Northern Ag Research Center and Eastern Ag Research Center both opened doors to new office and laboratory facilities this summer in Havre and Sidney, respectively. As the College of Agriculture and Montana Agricultural Experiment Station have been upgraded, including renovations in historic Linfield Hall and Leon Johnson Hall, it is easy to walk around campus and view our facilities with pride, none of which would have been possible without your support.

With these great facilities, the focus turns to people. People are the heart and soul of the College – students and faculty alike. One does not exist without the other. Despite a new classroom or a computer lab, the student experience is still similar to your experience at MSU, no matter when you graduated.

Our committed faculty continue to teach and create leaders in the agricultural industry of tomorrow. They conduct research on issues impacting Montana, both in Bozeman and throughout Montana, specifically at the Research Centers around the state. And many of our instructors and researchers must do more with less. It is no secret that higher education has challenges with state and federal funding across the country. Montana is no exception; however, thanks to your support we can continue to provide a premier education from our distinguished faculty to our dedicated students.

Right now we have a tremendous opportunity to assist the College of Ag.

If you join the Alumni Association as a new member, or upgrade your annual membership to a lifetime membership, a donation will be made

to the College of your choice on your behalf at no cost to you. (We, of course, assume you will choose the College of Agriculture!) A new annual membership will result in a \$50 contribution from the MSU Foundation to the College. A lifetime membership, either new or as an upgrade from an annual membership, will result in a \$100 contribution to the College.

These contributions will go to the College of Ag's Greatest Needs Fund. This fund allows the College the ability to address pressing needs of students, faculty and programs which state funding cannot always address. Not only do you receive the benefits of joining or upgrading your membership in the Alumni Association, but your membership directly helps the College of Ag. Again, there is no additional cost to you for this added donation. Simply join as a new member or upgrade to a lifetime membership and the College of Ag receives a direct benefit from your support.

It is the time of year when we give thanks for what we have and share with those we love. On behalf of the College, I want to thank you for your support! I hope you will continue to support us, through your time, your commitment, your advocacy and your financial contributions, particularly to our wonderful faculty, students and their programs.

Included in our publication is a returnable envelope with options to join the Alumni Association or to simply donate to our student and faculty programs.

You can call the Alumni Association at 406-994-2401 or go to www.AdvanceMSU.org to join or donate. Or, feel free to reach out to me at 406-994-7671 or darin.paine@montana.edu.

Please take a moment and reflect on what the College of Agriculture means to you and consider supporting the College. You can continue to have a positive impact on the people within the College. They are the most precious commodity we have.

*With thanks,
Darin Paine
Development Director*

Thank you, 2010 and 2011 Donors!

Each and every donation advances the College of Agriculture, resulting in a positive impact on our students. *AgExcellence* was not published in 2010, so we have two years of donors to recognize. Below is a list of individuals and organizations that made donations to the College of Agriculture in the calendar years of 2010 and 2011. Contributions went toward scholarships, facilities like the Animal Bioscience Building, student and faculty support and program support. We sincerely thank you for your donations!

“We cannot always build the future for our youth, but we can build our youth for the future.”

—Franklin D. Roosevelt

\$1-\$499

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“Be Happy in Your Work”

One Billings-area farmer’s MSU dreams are honored for future generations.

When John Stratford was growing up on a dryland wheat farm south of Billings, times were tough. His father, a former teacher who homesteaded on Blue Creek in 1910, encouraged John to further his education. But that didn’t mean he could afford to send his son to Montana State University in the midst of the Great Depression.

The third of seven children, John thought he could swing the expense on his own. He arrived in Bozeman in 1938 with plans to get a job to support himself while attending MSU. But competition was stiff for what little employment was available. All the jobs went to upperclassmen and John’s plan crumbled. Out of funds, he hitched-hiked back to Billings.

His father, greatly disappointed, told John, “Well, if you’re not going to be educated, I guess you might as well farm.”

John ran what is now Stratford Farms from then until his death in 1999. After serving in the Pacific during WWII, he participated in the great post-war expansion of American farm productivity. Following the advice of MSU Extension’s county agents, Stratford was one of the first in his area to put in grassed waterways and contour strips to combat soil erosion. A founding member of the Montana Grain Growers Association, he encouraged other farmers to adopt progressive research-based farming practices and to be stewards of their land for the long-term.

Aided by the techniques he learned from MSU, John’s farm prospered. He was able to give his three sons the educational choices he never had. The farm, which has been a combined wheat and cattle operation since the late 1960s, is now in the hands of John’s brother. John’s sons went on to various careers, none of them in agriculture, but they never forgot their roots.

“My father was always telling me, ‘Be happy in your work,’” said Stratford’s son Scott, a former college textbook editor who lives in the Boston area. “He made farming seem like a calling, not just a way to pay the bills ...something to be proud of.”

After John Stratford passed away in 1999, his family endowed the John Stratford Memorial Scholarship in the College of Agriculture. The scholarship provides funds towards the first-year expenses of an incoming Agriculture student from a family farm background. Though none of his three sons, nor John himself, attended MSU, the family wanted to help give young people from farm backgrounds like John’s choices that he never had.

“In my dad’s time, his options were to be educated or be a farmer. But today, you have to *be* educated to succeed in agriculture,” Scott Stratford said. “In a small way, we want to help someone each year who is in exactly the situation our dad was—needing a little extra help to start his or her college education.

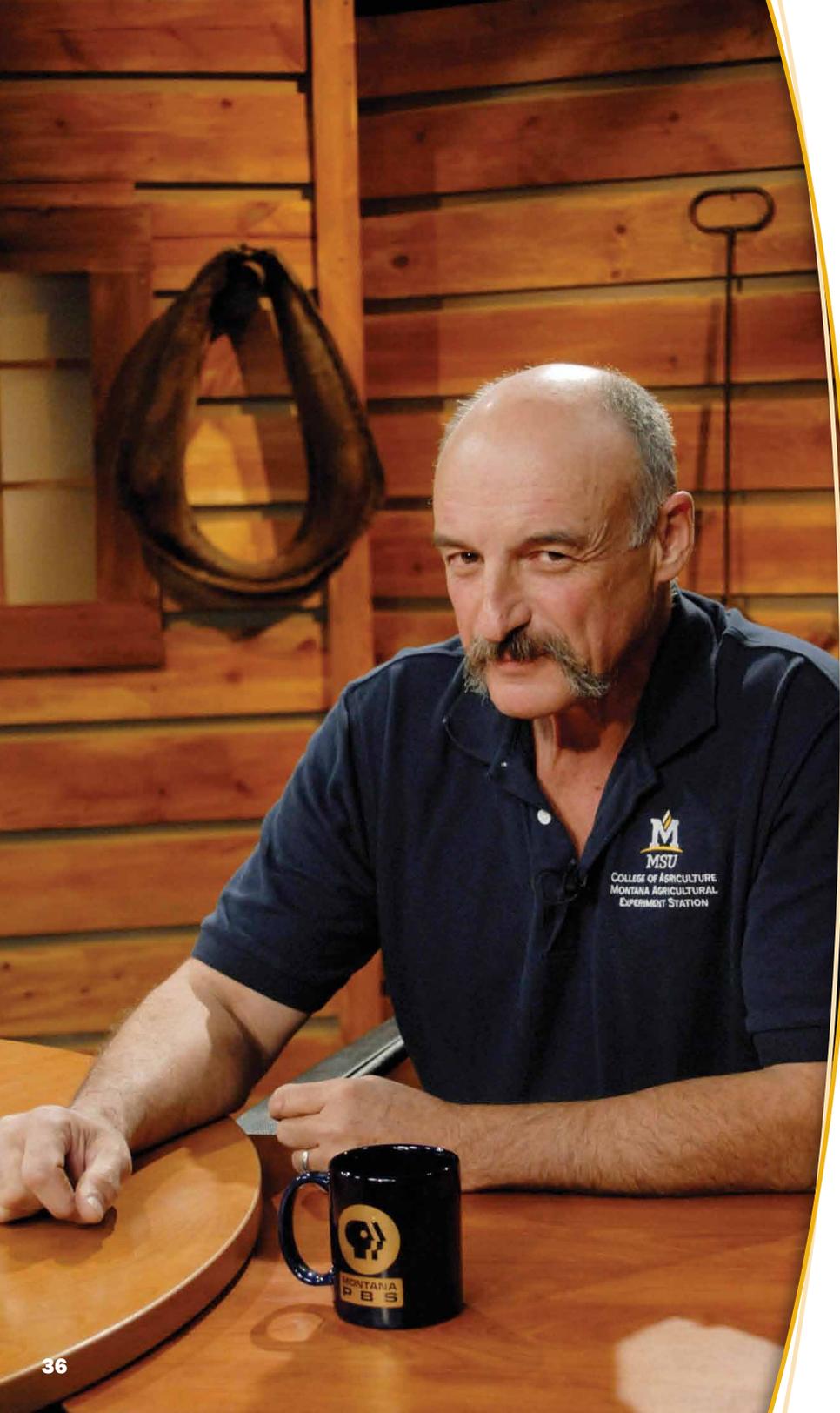
“I always feel reinvigorated when I come onto campus and see the choices that kids are able to make because of the resources that MSU is offering,” said Scott, who regularly attends the annual College of Agriculture dinner where scholarship recipients and donors get the chance to meet.

A phrase on John’s headstone sums up how he hoped to be remembered for his love of agriculture and his commitment to stewardship across generations:

“He made two blades of grass grow where one grew before.”



John Stratford, shown with one of his three sons, circa 1953. The Stratford family is one of the many families and individuals who have chosen to memorialize and honor a special person through a College of Agriculture scholarship. Each scholarship is an inspiring story of its own. Each makes one person’s education dream possible. (Photo courtesy of the Stratford family)



In Memory of Bob Gough

Dr. Robert “Bob” E. Gough passed away September 14, 2011 after battling cancer.

An incomparable colleague and an extraordinary human being, Gough is a premier example of a faculty member who was highly engaged at MSU, the land-grant university. Through his life, career and many passions, he innovatively contributed to the pursuit of knowledge and discovery through teaching, research and outreach with the people of Montana.

Gough was born and raised in Rhode Island. He received three degrees from the University of Rhode Island (URI), a Bachelor of Arts in English with minors in psychology, agriculture, music, history and Latin, a Master of Science in agriculture in the study of pomology, and a doctorate in botany. He joined the faculty at URI in the plant sciences department as a professor of horticulture.

Arriving at Montana State University in August 1995 to serve as the Extension Horticulture Specialist, Gough quickly became known across Montana simply as “Dr. Bob.” As he filled this role and accomplished his responsibilities with humor, unending knowledge and grace, Gough made an impact on everyone he touched, and on those he never met, through his articles, books, radio shows, appearances on *Montana Ag Live!* and in Master Gardener classes.

Gough received numerous awards for his teaching abilities and extension activities. He was named a Fellow by the North American Colleges and Teachers in Agriculture in 2000. In 2004, Gough was one of the inaugural recipients of the MSU Excellence in Outreach Award.

In 2005, Gough was selected by the College of Agriculture to serve as the Associate Dean for Academic Programs until his retirement in 2010. He was a tireless advocate for the College’s teaching mission through his efforts with students and faculty. For example, Gough created, organized and taught a new course for freshmen in agriculture and environmental sciences (Ag101) as part of his comprehensive strategy for student recruitment and retention.

Robert E. “Dr. Bob” Gough Memorial Scholarship

Thanks to generous personal donations from Cheryl Moore-Gough and Jeff Jacobsen, we have initiated an effort to endow a scholarship in Dr. Bob’s honor that will benefit future horticulture students: the Robert E. “Dr. Bob” Gough Memorial Scholarship. Donations are still needed to fully endow the scholarship at \$25,000. An envelope is enclosed in this publication if you would like to consider making a donation in honor of Dr. Bob. If you have any questions, please contact the College of Agriculture development director, Darin Paine, at 406-994-7671 or email darin.paine@montana.edu.

LEFT: Robert Gough on the set of Montana Ag Live.

College of Agriculture and Montana Agricultural Experiment Station

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 John Sherwood, Plant Sciences & Plant Pathology (PSPP)
 Ken Kephart, Research Centers

DEPARTMENT	MAJORS	OPTIONS			MINORS		GRADUATE PROGRAMS
Agricultural Economics & Economics	<i>Agricultural Business</i>	<i>Agribusiness Management</i>	<i>Farm and Ranch Management</i>		<i>Agricultural Business</i>		<i>Master of Science in Applied Economics</i>
Agricultural Education	<i>Agricultural Education</i>	<i>Ag Relations</i>	<i>Broadfield Teaching</i>				<i>Master of Science in Agricultural Education</i>
Animal & Range Sciences	<i>Animal Science</i>	<i>Equine Science</i>	<i>Livestock Management & Industry</i>	<i>Science</i>	<i>Animal Science</i>		<i>Master of Science in Animal & Range Sciences</i>
	<i>Natural Resources & Rangeland Ecology</i>	<i>Rangeland Ecology & Management</i>	<i>Wildlife Habitat Ecology & Management</i>		<i>Natural Resources & Rangeland Ecology</i>		<i>Doctor of Philosophy in Animal & Range Sciences</i>
Land Resources & Environmental Sciences	<i>Environmental Sciences</i>	<i>Environmental Biology</i>	<i>Soil and Water Science</i>		<i>Soil Science</i>	<i>Water Resources (LRES)</i>	<i>Master of Science in Land Rehabilitation (multi-unit)</i>
	<i>Geospatial & Environmental Analysis</i>						<i>Master of Science in Land Resources & Environmental Sciences</i>
	<i>Land Rehabilitation</i>						<i>Doctor of Philosophy in Ecology & Environmental Sciences</i>
Plant Sciences & Plant Pathology	<i>Plant Science</i>	<i>Crop Science</i>	<i>Plant Biology</i>				<i>Master of Science in Plant Pathology</i>
	<i>Environmental Horticulture</i>	<i>Envir. Horticulture Science</i>	<i>Landscape Design</i>		<i>Environmental Horticulture</i>		<i>Master of Science in Plant Science</i> <i>Doctor of Philosophy in Plant Science</i>
Immunology & Infectious Diseases	<i>Pre-Vet Non-degree Program</i>						<i>Master of Science in Immunology & Infectious Diseases</i> <i>Doctor of Philosophy in Immunology & Infectious Diseases</i>
Multidisciplinary	<i>Biotechnology</i>	<i>Animal Systems (ImID)</i>	<i>Plant Systems (PSPP)</i>				
	<i>Sustainable Foods & Bioenergy Systems</i>	<i>Agroecology (LRES)</i>	<i>Sustainable Crop Production (PSPP)</i>	<i>Sustainable Livestock Production (A&RS)</i>			
					<i>Entomology (LRES A&RS and PSPP)</i>		<i>Master of Science in Entomology (multi-unit)</i>



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