



PSPP - Plant Science Says

September, 2019

MSU's Plant Pathologists Rock Cleveland at the APS Annual Meeting
By Uta McKelvy, PhD candidate

From August 3 to 7, over 1200 members and friends of the American Phytopathological Society (APS) gathered for the annual Plant Health meeting in Cleveland, Ohio. MSU's PSPP department was well represented with nine plant pathologists having made the journey from Montana to the Rock and Roll capital of the world.

"Sow, Know, and Grow" was this year's meeting theme, which acknowledges and celebrates the broad diversity of work in the plant pathology field, from fundamental research to applied field work. Three speakers were selected to represent these aspects in Mondays' plenary session. —

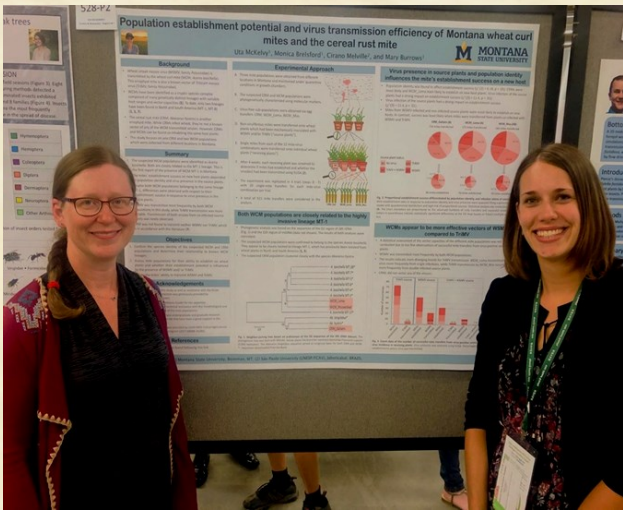
Dr. Boyd Padgett, plant pathologist at Louisiana State University, emphasized the importance of plant pathologists to have their "boots on the ground", because the field is where we can monitor disease epidemics, notice pathogen resistances, validate management recommendations, and get in touch with stakeholders. Being in the field allows us to gather information that can spark new research projects that address emerging disease problems and develop new management approaches. Hilary Parker, a data scientist at the online personal styling service, Stitch Fix, spoke



Eight out of nine Plant Pathology Bobcats gathered behind the Cleveland sign. From Left to right: Frankie Crutcher, Uta McKelvy, Swarnalatha Moparthi, Bright Agindotan, Mary Burrows, Alan Dyer, Lipi Parikh, and David Wheeler. Unfortunately, David Sands was just too occupied discussing his poster so he couldn't join us for the photo.

about approaches to, challenges in, and solutions for big data handling. In her talk "A design mindset for working with data", she shared her observations and experiences from working in the technology sector and concluded with four major points of advice on how to build resilient data systems:

- 1) Consume and participate, i.e. be in touch with the processes and products of your work.



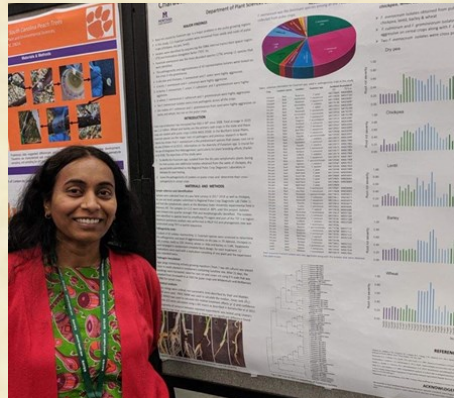
Mary Burrows, Professor and Uta McKelvy, PhD candidate (right). Uta was excited to showcase her poster on "Population establishment potential and virus transmission efficiency of Montana wheat curl mites and the cereal rust mite" and thankful for the moral support by her adviser Mary Burrows, Extension Plant Pathologist (left).



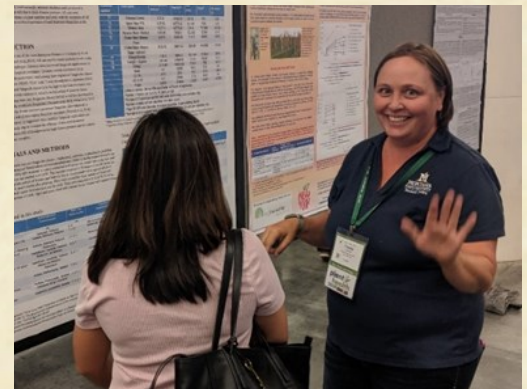
MSU's David Sands showcasing his poster "Flipping plant pathology: using biocontrol to kill our worst weeds" to one of many groups of interested Plant Health attendees.



Lipi Parikh, Postdoctoral Researcher at the Regional Pulse Crops Diagnostic Lab, and Bright Agindotan, former Research Assistant Professor in the same diagnostic lab, standing in front of Lipi's poster on "The potential of herbal essential oils to control pulse crop pathogens."



Swarnalatha Moparthi, Post-doctoral Researcher at the Regional Pulse Crops Diagnostic Lab, was ready to pitch her poster on the "Identification and characterization of *Fusarium* spp. associated with root rot of dry pea in Montana."



Frankie Crutcher, Assistant Professor at the Eastern Ag Research Center in Sidney, MT, was delighted to chat about her poster on the "Efficacy of seed treatment fungicides for the management of seed-borne *Ascochyta* blight disease of chickpea under high disease pressure."

2) Purposeful practice, i.e. in order to build your "design muscle" pose a problem and exercise all the steps through the problem solving process from beginning to end.

3) Give the right half of your brain space, i.e. actively engage your artistic and creative side in the process.

4. Cultivate empathy for others and yourself to help foster a blameless environment where problems can be acknowledged and everybody engaged in solving them.

Finally, Dr. William Powell, co-director of the American Chestnut Research and Restoration Project, talked about using biotechnology tools to rescue the American chestnut. Dr. Powell highlighted the environmental, economic, and social impacts of chestnut blight disease in North America and talked about his research efforts to protect the genetic diversity of this keystone tree species by enhancing blight tolerance. Through genetic engineering, the enzyme oxalate oxidase could be introduced into chestnut trees, enabling them to counteract the pathogen's major virulence factor, oxalic acid. Looking ahead, these genetically engineered trees will undergo extensive review by federal regulatory agencies before they can be used to help rescue remnant populations of American chestnut.

Of course, the plenary session was only one of many events during the five informative, stimulating, motivating, and very busy days of the meeting. A total of 11 workshops, 22 technical sessions, 22 special sessions, and 615 poster presentation provided lots of opportunity to learn about the latest advances and diverse research efforts in the APS community and to truly embrace the theme "Sow, Know, and Grow". I really enjoyed attending Plant Health 2019 where I learned about so many different cropping systems, pathogens, disease problems, and research projects and methods. Professionally, this broadened my horizons significantly. In addition, this meeting was an excellent occasion to interact and build friendships with plant pathology peers from across the U.S. and beyond.

This year's APS meeting concluded with the Cleveland Rocks! Celebration night at the Rock & Roll Hall of Fame, which allowed us to channel our inner rock star and showcase

our coolest dance moves. It sure felt good to shake off those four long days of conference events to the greatest rock and pop hits.

Looking ahead, next year's Plant Health 2020 meeting will take place in Denver, CO, August 8 to 12. Interestingly, the United Nations General Assembly also declared 2020 as the International Year of Plant Health (IYPH), which provides "A once in a lifetime opportunity to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment, and boost economic development (FAO)". Therefore, 2020 will be an exciting and busy year for the plant pathology and plant sciences community and the annual APS meeting will surely be an event worth attending!

If you are considering attending next year's meeting, check out the APS Foundation. Among other things, they provide funds to help students and early-career professionals with travel costs to annual meetings. The APS Foundation is always looking for contributions and they have come up with a great new way to give that I would like you to consider! You can support APS by shopping on [amazonsmile.com](https://www.amazon.com/smile). This is a mirror website of [amazon.com](https://www.amazon.com) where you can buy the same products for the same prices at no additional costs, but 0.5 % of each eligible purchase are contributed to a charity of your choice. If you'd like to support the APS Foundation through [amazonsmile](https://www.amazon.com/smile), here's how to set it up:

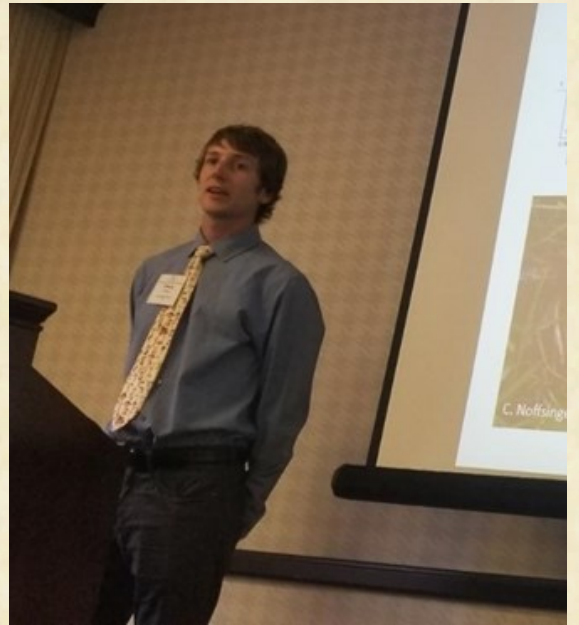
Sign in to [smile.amazon.com](https://www.amazon.com/smile).

Go to "Your Account" at the top of any page.

Select the option "Change your Amazon Smile charity" under the "Other programs" section.

Select: American Phytopathological Society Inc.

2019 Annual Mycological Society of America (MSA) Meeting
By Chance Noffsinger, Graduate Student
Dr. Cathy Cripps and I attended the annual MSA meeting in Minneapolis, Minnesota from



The former graduate students of the late Dr. Orson K. Miller Jr., from left to right: Catherine Aime (Purdue), Rytas Vilgalys (Duke), Cathy Cripps (Montana State), and Van Cotter (Duke).

Chance Noffsinger, graduate student, presenting his thesis work on *Russula* in the Rocky Mountain alpine zone.

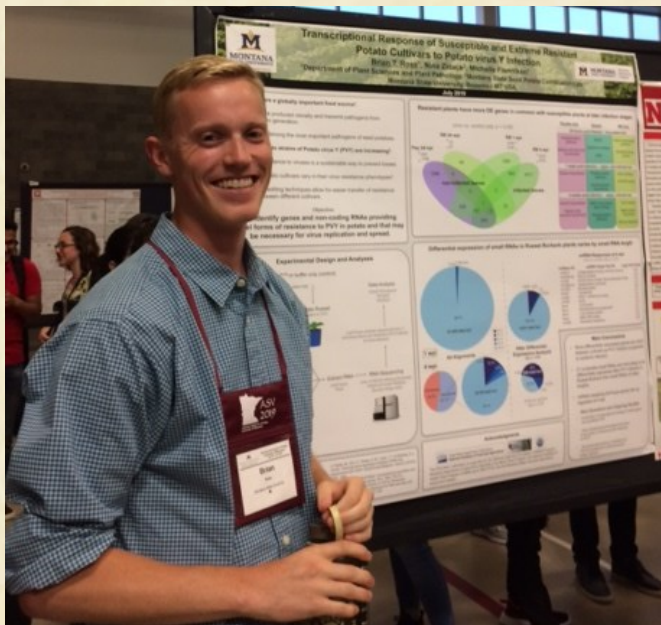
August 12–14. I gave an oral presentation summarizing my thesis research on the fungal genus *Russula* in the Rocky Mountain alpine zone. Although I was a little nervous, my presentation was well received and I was able to meet and discuss my work with leading authorities in the field. Their input will definitely improve the quality of my research and will hopefully lead to professional connections and collaborations in the future. Cathy gave an oral presentation during the Fire Symposium summarizing her research focused on whitebark pine, fire ecology, and ectomycorrhizal fungi. She also presented a poster on the fungal genus *Hebeloma* in the Rocky Mountain alpine zone. Cathy's talk was well attended and her poster was so crowded with interested mycologists, I couldn't even get near it! Cathy also had an opportunity to catch up with her old graduate school mates and many other friends and colleagues. Another former graduate student of the Plant Science and Plant Pathology department was also in attendance, Todd Osmundson. Todd is now a mycology professor at Wisconsin La Crosse and currently Cathy and Todd are collaborating on multiple research projects focused on black morels and whitebark pine.

Overall, the meeting was amazing; I made some great professional connections for the future (Thanks to Cathy!) and got to experience some of the unique city culture that Bozeman lacks. I'm already looking forward to next year's meeting in Gainesville Florida! I would like to thank the Plant Science and Plant Pathology department and the College of Agriculture for supporting my travel to MSA!

American Society for Virology Conference

By Brian Ross, Grad Student

Members of the Flenniken Lab traveled to Minneapolis, Minnesota for the American Society for Virology (ASV) conference from July 20-24. This get-together for virologists occurs annually at American universities during the summer. Around 1,200 scientists and students from around the U.S. and the world came to this year's event. The days started with world-renown virologists giving talks to the entire conference population. The research focus of these talks varied widely – from highlighting the underappreciated role that sex can play in mammalian virology, to studies on HIV, influenza, plant viruses, bacteriophages, and others. Perhaps the



Brian Ross, graduate student, giving a poster presentation on potato-Potato virus.

most thought-provoking talk to me was about the unique physiology of bats and how this facilitates viral transmission and zoonosis events. After lunch, there were break out sessions with talks focused on particular research areas. There was one session fully devoted to plant virology, where talks included research on what the secondary structure of the 5' UTR of Potyviruses (e.g., Potato virus Y, Papaya ringspot virus, Soybean mosaic virus, etc.) can teach us about translation initiation, to challenges to the long-standing assumption that plant viruses dilate plasmodesmata in cells to facilitate their movement.

PhD students in the Flenniken lab, Alex McMenamin and Fenali Parekh, gave talks in the Invertebrate Virology section of presentations on their work in honey bee immunology. I gave a poster presentation on my work in potato-Potato virus Y interactions and Vanessa Orcutt, undergraduate in our lab, presented a poster during the undergraduate poster session on research done on honey bees in the Flenniken lab. The days culminated with evening socials, where many attendees enjoyed a "Minnefluena" wild rice ale, which was specially brewed for the conference. "

2019 Beetle Course, Southwestern Research Station, Portal, AZ **By Laurie Kerzicnik, Extension Entomologist**

I attended the first ever Coleoptera Identification Workshop in the Chiricahua Mountains in southeastern Arizona from August 10-18. The Chiricahua Mountain range attracts scientists from many different disciplines due to its rich floral, faunal, and geological properties. The course covered lectures, an overview of the identification of beetles from all families worldwide, and sampling trips in the surrounding area. We spent our evenings sampling beetles at several blacklights. Fourteen people were at the workshop with instructors from New Zealand, Santa Barbara Museum of Natural History, Louisiana State University, and a former coleoptera specialist from the Smithsonian Institute. The other workshop attendees ranged from APHIS entomology identifiers to professors with a special appearance by Mike Ivie's former graduate student, Charles Hart. I also have two new live pets for my office-a vinegaroon and an ambush bug.



Charles Hart, former PSPP graduate student, shows some of his beetles collected at the course.

New Employees

Victoria Blake



Hi Plant Sciences! I am really pleased to be back at MSU after eight years. Since leaving the barley program in 2011, I was the managing curator for the Triticeae Toolbox, a curator for SoyBase and now I am back in Li Huang's lab with an RSA from the USDA to curate GrainGenes (graingenes.org) the ARS-sponsored database for the small grains.

At GrainGenes, I am primarily responsible for the SQL database that holds archives like genes, maps and publications. In the last year I curated the 28 new map sets (each with 21 maps) for the wheat nested association mapping (NAM) project, added 42 new map sets through a collaboration with the AAFC / Canada, curated ~2100 durum wheat QTL that are aligned with the Svevo genome assembly on GrainGenes' JBrowse genome browser, and more. Currently, I am working with Dr. Laurel Cooper from Oregon State to update the ontology links on GrainGenes' traits and curate all 3,000+ genes and QTL from the Catalogue of Gene Symbols for Wheat.

This semester, I am also teaching a special topics course PSPP591-002 with Burcu Alptekin entitled 'Omics and Online Resources for Plant Researchers'. Through this course we hope to provide a survey of modern biological techniques to generate 'Big Data', accompanying costs, and free online tools to assist in research.

Deji Owati

My name is Ayodeji Owati, call me "Deji". I graduated with a Ph.D. in plant pathology from this department and will continue my research as a Post-doctoral researcher in pulse crops pathology under the supervision of Dr. David Wheeler and Dr. Mary Burrows. My research will focus on identification, characterization, and development of rapid



Deji Owati, post doc

detection tools for both laboratory and field detection of pathogens (bacteria, fungi, nematodes, oomycetes, and viruses) associated with pulse crop diseases.

I will be based at the Regional Pulse Crop Diagnostic Laboratory located in Marsh lab.

New Graduate Students

Hannah Hof (Thum)



My name is Hannah Hoff and I am a new PhD student in Dr. Ryan Thum's lab. I graduated from Northland College with a Bachelor of Science in Biology, where I led and participated in research related to various issues of community ecology.

My graduate work will focus on evolutionary ecology of watermilfoil hybrids, including herbicide resistance and its implications for management techniques such as biocontrol. I love all things outdoors, and am excited to get to know Bozeman and the endless recreation opportunities that exist here.

Joshua Pol (Wanner)



My name is Joshua Pol, you can call me Josh. I am a new student here at Montana State University, excited to be pursuing my Doctorate in Plant Science

and Plant Pathology in the Wanner Lab. I am not a lumberjack or a fur trader, I have

never lived in an igloo or owned a dogsled, although I have been dogsledding. I grew up with a Prime Minister not a President, I speak English and French, I pronounce it about not a boot, a toque is a hat, a chesterfield is a couch and it is pronounced ZED not ZEE. I am Canadian.

I completed my Undergraduate degree in Ontario and Masters of Pest Management degree in British Columbia, Canada, before spending two years working in Plant Health for the public sector.

Like many of you here, I would consider myself an outdoor enthusiast. I enjoy camping, cycling, drinking craft beers and being out in nature. I look forward to interacting with everyone in the PSPP department and collaborating both scientifically and socially.

Pragya Kiju (Ivie and Reddy)



My name is Pragya Kiju. I was born in country of Nepal, the land of the Himalayas. I was raised in an agricultural family. Now and then, I would help my family with agricultural chores and this influenced my interest

in studying agriculture. Hence, I pursued Agriculture for my undergraduate degree at the Institute of Agriculture and Animal Science which is affiliated with the Tribhuvan University, Bhairahawa, Nepal. I am working as a Master's student under Dr. Michael Ivie in the Entomology Program. My work focuses on the development of management strategies for Pea Leaf Weevil in Montana. I am interested in the biological control of insects. I am looking forward to exploring Bozeman and the insect world.

Montana Ag Live Schedule

9/8 - Mark Quinn, Professor of Microbiology and Director of MSU's Veterinary Science Program (WIMU)

Topic: Pet owners and livestock producers alike use the services of our veterinarians. Some vets specialize in large animals, like horses of every sort, hogs, sheep & goats, and cattle & bison. Other vets restrict their practice to domestic pets ranging from dogs and cats to canaries, bunnies, turtles and iguanas. How do we educate vets? Montana State University, along with Higher Ed units in Idaho and Utah, collaborate with Washington State University in its Regional Program in Veterinary Medical Education. Mark Quinn, MSU-Bozeman Professor of Microbiology and Director of MSU's Veterinary Science Program (WIMU), will bring viewers up to date on the University's Vet Science program.

9/15 - Tim Seipel Montana State University Crop Land Weed Specialist will discuss managing weeds in an era of herbicide resistance.

Topic: For years, the production agriculture industry, along with many private homeowners, have used a selection of chemical products to control unwanted and invasive plant species. However, some weeds have adapted and developed resistance to these herbicides. Tim Seipel, Assistant Research Professor at MSU-Bozeman and a Cropland Weed Extension Specialist, joins us this week in a discussion about managing weeds in an era of herbicide resistance.

9/22 - Bob Peterson, MSU entomologist and risk analysis specialist.

Topic: Insects can cause a lot of damage to Montana's crops, resulting in additional production expenses and a loss of revenue to our farmers, ultimately resulting in higher costs to consumers. Professor Bob Peterson, an MSU-Bozeman entomologist and agricultural and biological risk analysis specialist, answers questions about the perceived reduction in Montana's insect populations.

9/29

Sreekala Bajwa, MSU's Vice President and Dean and Director of the College of Agriculture.

Topic: The MSU-Bozeman College of Agriculture educates students, issuing 24 different undergraduate and graduate degrees. It operates a variety of world-renowned laboratory and field R&D facilities across Montana. The Extension Service, located in all 56 Montana counties, is a part of the College's outreach. Sreekala Bajwa, Dean and Director of the College of Agriculture helps us take a look at the future direction of the College and the Agriculture Experiment Station.

Publications

Ou, T., Xu, W.F., Wang, F., Strobel, G., Zhou, ZY., Zhong, HX., Liu, J., Xie, J. 2019. A microbiome study reveals seasonal variation in endophytic bacteria among different mulberry cultivars. *Computational and Structural Biotechnology* 17: 1091-1100.

Grants

Kevin Wanner

Title: Insecticide Resistant Alfalfa Weevils in the Western US: Quantifying the Scope of Resistance and Implementing a Plan to Manage the Threat, National Institute of Food and Agriculture. co-PI Ian Grettenberger, University of California Davis

Non-Technical Summary: Alfalfa weevil, the key economic pest of alfalfa throughout the continental US, has developed resistance to the pyrethroid group of insecticides (Warrior®, Mustang® Maxx and others) used to control it, making its economic damage more severe in these areas and foretelling broader management problems. Several production areas in the Western US and Canada have reported failures of insecticides to control alfalfa weevil, and we have corroborated producer reports of pyrethroid-resistant weevils with laboratory data. In two affected areas at minimum, producers have abandoned alfalfa as a crop due to an inability to control insecticide-resistant weevils. This

threatens not only the economics of the \$20 billion alfalfa forage industry, but also the \$67 billion and \$38 billion beef and milk commodities that depend in part on alfalfa forage production. A rapid research and Extension response is needed to mitigate economic losses by prolonging the useful life of insecticides through resistance management. Research will quantify the degree and geographic scope of insecticide resistance using dose response experiments and monitoring bioassays. Science-based results will be incorporated into Extension media that provides resistance management recommendations to stakeholders within the framework of integrated pest management (IPM). A multistate team of research scientists and Extension specialists representing Arizona, California, Colorado, Montana and Oregon will develop and deliver resistance management recommendations in the Western US.

Kevin McPhee - "Pulse Crop Breeding", USA Dry Pea and Lentil Council.

Jason Cook - "Development of Montana adapted FHB resistant winter wheat varieties", USDA.

Alex McMenamin and Michelle Flenniken - "Determining the Role of Honey Bee Heat Shock Proteins in Virus Detection and Defense Mechanisms", Project Apis m.

Patents

Gary Strobel has been issued a new US patent 10383332 (August 20, 2019) which deals with the chemical formulation of gases produced by *Muscodor crispans*. The patent covers a reduced formulation that is antimicrobial but reveals that not all of the components of *M. crispans* are needed for bioactivity. This formula is being used as a food preservative in such items as salad dressings and soy milk to lengthen shelf life of the products.

Forcing Paperwhites

By Cheryl Moore-Gough

Extension Horticulture Specialist

Many of us like to have fresh flowers in our homes or offices to help brighten gloomy winter days. One of the easiest ways to do this is to force flowering bulbs. Paperwhite varieties (*Narcissus papyraceus*) are some of the easiest bulbs to force for indoor winter flowers. While I have to say their potent fragrance is overpowering to many (including me), the ease of forcing and beauty of the flowers wins new paperwhite fans every year. Here's how:

Unlike many other spring flowering bulbs, paperwhites don't require any chilling or other pretreatment. Kits are available online, but the process is so simple, why not try it in your own container? Two months before you'd like your plants to start flowering, place pebbles, marbles, or other non-absorbent media in a 4 to 5" deep bowl or other container that has no drainage holes. Fill with water to just below the tops of the pebbles. Carefully place the paperwhite bulbs on top of the pebbles, making sure that only the very bottom of the bulbs contacts the water. If you submerge the bulbs they will probably rot, so watch that water level carefully. Crowding the bulbs will give the nicest flower display. Put a few more pebbles in with the bulbs if they need more support. Place the container in a cool (35 to 45°F), dark location to form roots, which should take one to two weeks. Test the root development by gently tugging on the bulbs. If roots are developing, there will be some tension.

After roots have developed, bring the container into the light. Be sure to support stems as they grow if they look



thin and weak, as paperwhites grown indoors often fall over when they bloom. A decorative ribbon and some bamboo supports can do the trick and look nice. Your flowers should appear within 3 to 5 weeks.

Why not purchase a couple dozen bulbs, store them in the refrigerator, and start a new container every two to four weeks for beautiful blooms all winter? Start them in mid-September if you'd like blooms in time for Thanksgiving.

Recipe of the Month

Slow Cooker Zucchini Soup

1 1/2 pounds sweet Italian sausage
2 cups 1/2-inch pieces celery
2 pounds zucchini, cut into 1/2-inch slices
2 (28 ounce) cans diced tomatoes



2 green bell peppers, cut into 1/2-inch slices
1 cup chopped onion
2 teaspoons salt
1 teaspoon white sugar
1 teaspoon dried oregano
1 teaspoon Italian seasoning
1 teaspoon dried basil
1/4 teaspoon garlic powder
6 tablespoons grated Parmesan cheese, or to taste

Heat a large skillet over medium-high heat. Cook and stir sausage in the hot skillet until browned and crumbly, 5 to 7 minutes; drain and discard grease. Mix celery into cooked sausage; cook and stir until celery is softened, about 10 minutes.

Combine sausage mixture, zucchini, tomatoes, bell peppers, onion, salt, sugar, oregano, Italian seasoning, basil, and garlic powder in a slow cooker. Cook on Low for 4 to 6 hours. Garnish each serving with 1 tablespoon Parmesan cheese. Serve with French bread or over rice or noodles.

September Birthdays

Tracy Dougher	1
Laurie Kerzicnik	2
Irene Decker	5
Qing Yan	11
Jennifer Lachowiec	14
Michelle Flenniken	18
Emma Rice	19
Gary Strobel	23
William Dyer	26
Mark Young	27
David Baumbauer	27
GunNam Na	27



We also want to wish Joseph Fenoglio, Research Associate in the Pulse lab, all the best as he is leaving to attend Kansas State University as a graduate student.



Farewell to Bright Agindotan

Bright, a Research Assistant Professor and the manager of the Regional Pulse Crop Diagnostic Laboratory will be starting a new position as a Molecular Biologist with the USDA-APHIS-PPQ-ST, Beltsville, Maryland, after five years with the Montana State University. Bright would like to thank all PSPP staff and faculty for their support, especially the Marsh Lab family and Mary Burrows.

Congratulations Bright on your new position and we wish you all the best!



Top - Farewell dinner for Bright Agindotan, clockwise from bottom left: Collings Bugingo, Bright Agindotan, Monica Brelsford, Deji Owati, Mary Burrows, Joseph Fenoglio, Lipi Parikh, and Swarna Mo-parthi.

Middle - Bright Agindotan and Mike Ivie, master griller.

Bottom - Bridget Westfall, Host, and Bright Agindotan along with fellow Marsh Lab employees.