PSPP - Plant Science Says *September 2018*

VanWieren Wins Teaching Award

Rebecca VanWieren

Congratulations to Rebekah VanWieren for recently receiving the 2018 New Teacher Award of Excellence in College and University Teaching in the Food and Agricultural Sciences from the Western Region Academic Programs Section of the Association of Public Land Grant Universities. This award recognizes outstanding instructors in food or agricultural sciences who are seven years or less into their academic teaching careers. Rebekah would like to thank Tracy Dougher for accepting the award in her place.

"Landscape design is a smaller discipline, so it was an honor to be recognized as part of the broader world of agriculture and natural resources," Rebekah said. "I wouldn't have received the award without support from my colleagues, and I feel so fortunate to be in this department."

In regard to her teaching style, Rebekah commented, "In a managed way, I give a lot of responsibility to the students and have high expectations of their work with the communities. One of the things they value most in this course is having the opportunity to practice collaborative design, learning from challenges that arise, and making it a habit of mind to advocate and communicate clear reasoning for their design solutions."

Rebekah's final comment was, "I've always been fascinated by the integration of people and the environment and how we can utilize landscape design to sustain the long-term health of both within our communities. It's this integration that drives my teaching and scholarship, and I hope my students graduate with a passion to make a difference through landscape design within the communities they serve."

Prior to coming to MSU, VanWieren worked as a landscape architect at firms in Michigan alongside planners and civil engineers. Her focus then was primarily on leveraging the design of green spaces on commercial properties and streets to reduce the impact of storm water on waterways, an issue she said is becoming more important as development increases even in semi-arid Bozeman. Before working in practice, VanWieren earned bachelor's degrees in both biology and environmental science at St. Olaf College in 2001, followed by master's degrees in both landscape architecture and natural resource planning and policy from the University of Michigan in 2009.

The 3rd International Brassinosteroid Meeting
By Jennifer Lachowiec

I recently attended the 3rd International Brassinosteroid Meeting, held in San Diego, California from August 1-4. The meeting was very special since it was located in the San Diego area where the field of study of brassinosteroids boomed. Dr. Joanne Chory is considered the matriarch of the field, and this meeting was a homecoming for over a dozen of her post-docs who have gone on to become world-class researchers in the field.

During the conference, presentations covered a wide variety of topics. These included aspects of brassinosteroid signaling, specifically brassinosteroid reception at the cellular membrane, and signal transduction. Beautiful studies of how brassinosteroids affect plant development, including root growth and aerial architecture were also described. I shared a poster on the role of primary transcription factors in brassinosteroid signaling and their role in regulating consistent developmental processes.

I was most interested in the topics discussing brassinosteroids and stress responses and applications in crops. Interestingly, in China, brassinosteroids are widely marketed as growth modulators, to improve crop yields. However, the mechanisms underlying their contributions are poorly understood.

Salk Institute in La Jolla.

During the meeting, I had the opportunity to visit the Salk Institute, with its brutalist architecture right on the Pacific coast in La Jolla. Wolfgang Busch gave me a tour of his growth center and laboratory, and he showed me his automated phenotyping system of plant roots. I also saw the robot they use for placing tiny Arabidopsis thaliana seeds onto plates for controlled growth experiments.

I left the meeting inspired, with the start of several exciting collaborations. And a dip in the ocean certainly was a boost too!

WheatCAP – Summer Education Activities
by Jason Cook

Starting in 2017, a multi-institutional consortium of wheat breeders/geneticists known as WheatCAP was funded by the USDA to positional clone genes that control yield component traits in wheat. The lead principle investigator from Montana State University is Luther Talbert. One of the key elements of this project is to train a new cohort of plant breeders. WheatCAP currently has 17 PhD students, including Brittney Brewer-Jones from Montana State University, and four MS students located across the US.

Over this past summer the WheatCAP students had the opportunity to participate in a number of workshops and online classes. DeAnna Crow and Jason Cook, both part of the WheatCAP education coordination team, helped organize these education activities. The first workshop was hosted at Cornell University (June 25-29) to teach the students how to communicate science to the general public. This workshop was hosted by Sarah Evanega, Director of Alliance for Science, in collaboration with the USDA IWYP funded Gene Editing research project. Students learned how to relate their research to the public through storytelling methods. A second workshop was hosted by

Science Communications Workshop, Cornell University.

RNA-Seq Workshop, Kansas State University.

Eduard Akhunov at Kansas State University (July 9-13) to teach the students how to use RNA-Seq/Bioinformatics to identify candidate genes controlling the student's trait of interest. A total of 22 individuals participated in this workshop. Lectures from the Kansas State University workshop were recorded and are posted on the PBTN website: https://passel.unl.edu/communities/pbtn.

In addition to the workshops, WheatCAP students participated in two online courses. An online course held June – August was designed by Jean-Luc Jannink from Cornell University to teach the students how to use the T3 and GrainGene databases for their research. This online course hosted eight online lectures and all lectures are posted on PBTN. Lastly, another online course also held June – August by Loriana Sekarski (corporate soft skill consultant, Bonsai) taught the students soft skills. This course focused on having the students identify their strengths, learn how to leverage their strengths, develop their brand, and learn networking skills.

Looking forward, the next WheatCAP education event will be the student led WheatCAP Plant Science Symposium – Sponsored by Corteva Agriscience (Formerly Dupont-Pioneer). This event will be held on Friday, January 11, 2019, at the Conrad Prebys Aztec Student Union located on the campus of San Diego State University. Our very own Brittney Brewer-Jones is Co-Chair of this event and the theme for this symposium is "Bridging the Yield Gap using Functional Genomics". The symposium is scheduled a day before the Plant and Animal Genome (PAG) conference begins, and all are welcome to attend.

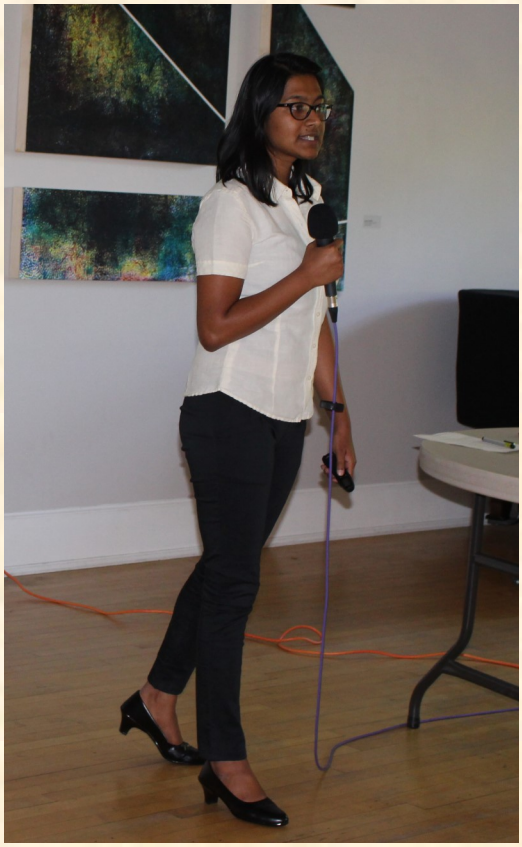
Pollinator Symposium
By Michelle Flenniken

On August 9th, the MSU Pollinator Health Center hosted a Pollinator Symposium in the Weaver Room of the Emerson from 6:30 - 8:30 pm. This event featured short research talks by MSU graduate students and a presentation and short films by nature photographer Clay Bolt. Local bee experts including Co-directors of the Pollinator Center Laura Burkle and Michelle Flenniken, Casey Delphia, and David Baumbauer were on hand to answer questions (though there were fewer of those than we would have liked, due to the hot summer evening). We were happy that the Dean of MSU's graduate school, Dr. Hoo, was in attendance to hear interesting and informative presentations.

Graduate students in the Flenniken lab gave honey bee focused talks including: "Honey Bee Health at Colony and Individual Levels" by Fenali Parekh, "Honey Bee Virology at the Cell-Level" by Alex McMenamin, and "Honey Bee Virus Research in Spain" by Sandra Barroso Arevalo, who was working in the Flenniken lab this summer.

Graduate students in the Burkle lab gave native/wild bee focused talks including:

Alex McMenamin and Fenali Parekh (below) giving talks at the Pollinator Symposium.



"Identifying pollinator-friendly plants in the Helena-Lewis & Clark National Forest" by Will Glenny and "Bumblebee Nutrition" by Mike Simanonok.

Clay Bolt, a Nature Photographer, gave a presentation on the importance of "Caring about the little things including bees" and the importance of scientific communication to inform the public and influence policy. A great example of that is the story of the Rusted Patch Bumble Bee. If you missed the event, you can watch the short films by Clay Bolt using the following links: A Ghost in the Making – Search for the Rusted Patch Bumble Bee (http://www.rustypatched.com/), National Geographic Short Film on the bumble bee buzz (TIL: A Bumblebee's Buzz Is Basically a Superpower https://video.nationalgeographic.com/video/til/160628-sciex-til-clay-bolt-bumblebees-buzz)

In summary, the Pollinator Symposium is an excellent forum for graduate students to share their work with each other, as well as the Bozeman community.

We hope to see you there next year!

WARC Field Day
By Mac Burgess

On July 26, Durc Setzer and Mac Burgess attended the Western Ag Research Center Field Day in Corvallis Montana.

Dr. Burgess presented on sustainable manure application for small scale producers. Many growers over-apply manure, resulting in accumulation of excess Phosphorus and Potassium in their soils. We spread a bag of manure out on a tarp and did a survey by show of hands as to whether the amount of nutrients present was sufficient for production of a typical crop. Of course, you'd need to know the numbers on the bag and do some math, so we demonstrated that process and found that most people underestimated the amount of nutrients present.

Durc presented on results of his survey of polyphenol contents of various small fruits including Haskap, Dwarf Sour Cherry, Black Currant, Service Berry, and Aronia. Durc also assisted Dr. Zach Miller with a demonstration of harvest methods for these fruits.

Durc Setzer demonstrating small fruit harvest to SFBS students at the MSU Horticulture Farm in Bozeman.

WARC Field Day attendees hearing Durc Setzer talk about properties of small fruits being trialed at four locations around Montana.

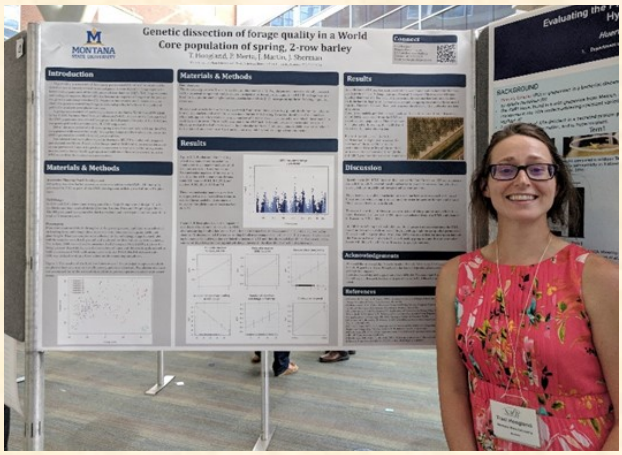
National Association of Plant Breeders - 2018

By Traci Hoogland

From August 7-10, I had the opportunity to travel to Guelph, Ontario, Canada, to participate in the National Association of Plant Breeders (NAPB) annual meeting. The theme of the meeting was, "Improving Plants to Improve Lives".

This was my second year attending this meeting and I have found the NAPB meeting to be an especially useful conference for plant breeding graduate students. The meeting is largely student focused, with opportunities for networking, soft-skills seminars, field tours, and socialization with other graduate students.

This year, as part of the graduate student socialization and activities, we even had the opportunity to paint the Guelph cannon. The cannon is a British naval gun used in the War of 1812 and moved to the university campus in 1880. Painting the cannon has been a student tradition for more than a hundred years. There are only three rules concerning painting the Guelph cannon: 1) The cannon must be painted at night. 2) After painting, the cannon must be guarded until morning (or any other group will be free to paint over your work) and 3) You must stake your claim to the cannon the day before painting. The first group to guard the cannon after sunrise gets to paint it that night, but the cannon must remain guarded right up until you are ready to paint it, if your guard leaves, another group is free to stake a claim.



Traci Hoogland presenting my poster entitled "Genetic dissection of forage quality in a World Core population of spring, 2-row barley".

Above: The graduate students pose next to the freshly painted Guelph cannon. We choose to paint the cannon with the various crops, fruits, and vegetables we study.

Dr. David Wolyn discusses the domestication and breeding of Russian Dandelion as a rubber-producing crop for Canada. Photo credit: Austin Dobbels.

The chance to tour active plant breeding field trials is another highlight of the NAPB meeting. This year we were able to tour breeding trials of maize, dry beans, soybeans, wheat, and even Russian dandelion – a potential domestic source of rubber. We were also able to see several demonstrations of field based technology, including hyperspectral data collection and drones. The field tours are an excellent opportunity to interact with the researchers directly and to ask questions. It is easy to be focused on a single crop as a plant breeder and forget the variety of crops grown commercially across North America, but the NAPB meeting and field tours are a great reminder.

For the first time, the 2018 meeting also included fellowship opportunities for both undergraduate and graduate students. The NAPB Borlaug Scholars Fellowship Opportunity was established "to develop the plant breeding science professions by strengthening the next generation of leaders" and Montana State's own Tavin Schneider was awarded one of the highly competitive undergraduate fellowships! Congratulations Tavin!

Ecological Society of America Conference
By Greg Chorak

This year the annual meeting of the Ecological Society of America (ESA) was held in the diverse (and humid) city of New Orleans, LA. The ESA is an organization of over 9,000 scientists with the goal of increasing resources for ecological science and communicating ecological science with the public, policy makers, and other ecologists. This year's ESA meeting took place August 5-10 and I had the pleasure of attending, thanks in part to a PSPP Student Travel Award. Ecology is a very diverse subject and, as such, the topics covered at ESA meetings range from the molecular level to large predator prey interactions to global climate. Being that the meeting took place in New Orleans, a city faced with many challenges due to climate change, urban ecology was a big topic at this year's meeting. The society planned many initiatives to engage and interact with members of the community by organizing field trips that showed first-hand the

The Mississippi River

Bourbon Street, New Orleans

challenges people in the area face, and also by bringing in local scientists and business people in to discuss the challenges moving forward in a city below sea level while sea levels rise. I presented on a new *Trapa* invasion that was found in the Northeast U.S., work that I completed for a research assistantship this past year.

I had the opportunity to serve on the Student Section of the ESA's board as treasurer this past year and the student section organized and hosted several workshops and events at the conference. We ran an event in partnership with ComSciCon aimed at helping students improve the communication of their science with the public. There were panelists from academia, social media experts, and the local press. We held an orientation and networking workshop to get students talking and collaborating with one another and help them get the most out of the conference. I ran an informational/entertainment event entitled "The Lefts, Rights, Ups, and Downs That Created a Successful Career in Ecology", where successful people in ecology told students their career story and the turning points and little lessons they learned along the way that they believe made their career successful. We also put on a student mixer on Tuesday evening at a local arcade bar where we provided food and free arcade games to help foster student networking in a less formal environment. A further initiative co-organized by the Student Section and the ESA was a daily career fair that focused on jobs outside of academia. Students had the option to have their resumes reviewed by a professional in a job they are interested in. They could also attend workshops and information sessions on many diverse career paths--from government agency to science journalism to journal publishing, just to name a few. The 2018 annual meeting was busy, exciting, and at times a little stressful, but I had a great time interacting with students and professionals in the ecological sciences and am already excited for next year!

Montana Ag Live - How it Got Started
By Jack Riesselman

Most of you realize that this is MSU's 125th anniversary and it is also the 25th anniversary for Montana Ag Live. Starting in 1994 with a seed grant from U.S. West Corporation, the program was modeled after a long running University of Nebraska program called Backyard Farmer. To make the program more diverse and interesting for viewers, Montana Ag Live incorporates a special guest on the panel each week. Guests have ranged from a local Gallatin Valley hop grower to the Governor of Montana.

The program is often the second most viewed program on Montana PBS following Antique Road Show. Part of the early success in developing a viewer base centered around selecting an entertaining host. Twenty five years ago, one of the most recognizable individuals in the College was Hayden Ferguson. With his knowledge of Montana and his rough, gruff style, he was a natural host for the program and he is credited for its early success.

The program could not air without the support of the program's underwriters. They include the Montana Bankers Association, The Montana Wheat and Barley Committee, The Montana Department of Agriculture, MSU Extension, the College of Agriculture and its Research Centers, Gallatin Gardner's Club and Cashman Nursery.

Montana Ag Live September Schedule

September 9
Larry Smith, farmer, rancher and conservationist from Phillips County, joins our panel to show how agriculture and conservation can be mutually beneficial.

September 16
Tracy Ross, equestrian specialist in MSU 's Animal Science Department, looks at "training the pony in your life".

September 23
Wendy Stock, economics professor at Montana State University, looks at labor issues affecting Montana agriculture and Montana's economy as a whole.

September 30
Tom Woolf, Bureau Chief with Fish Wildlife and Parks, talks about the potential effect of invasive species on agriculture and the Montana economy.

New Graduate Students

Joseph Jensen (Sherman)

My name is Joseph Jensen, but you can call me Joe. I am a new graduate student pursuing a PhD in plant genetics. I graduated from MSU this spring with a Bachelor's of Science degree in Plant Biotechnology. I received my start in agricultural research working at Central Ag Research Center where I learned the basics of plot work and the important role researchers have in helping farmers solve problems in the agricultural industry in order to improve it. My graduate work will focus on looking at malt quality and using mapping populations to try and find regions of the genome where these important genes are located. Like most people that have come to call Montana home, I enjoy the outdoors and like to go hiking, fishing, and horseback riding.

Aishwarya Kothari (Lachowiec)

I am Aish and I will be starting my Ph. D. in Dr. Jennifer Lachowiec's lab in Fall 2018. I recently graduated from Montana State University with a Bachelor of Science degree in Biotechnology: Plant

Sciences. My Ph. D. work will focus on the effect of heat stress on durum wheat and investigate the molecular mechanisms of it. The increasing global temperature is causing crop losses which affects the food supply of an increasing world population. Looking at the effects of heat stress on the developmental stages of wheat will tell us how we can overcome them and get a better yielding crop. I am excited to continue working in PSPP. I have been in Bozeman for 2 years and I love the beautiful outdoors.

Charles Watt (Burgess)

My name is Charlie Watt and I am a new Doctorate student. I moved here most recently from Utah but I grew up in New Hampshire and Virginia. My background is in ecology and I have done research on brook trout and freshwater mussels in the Shenandoah Mountains of Virginia. Since receiving my undergrad degree, I have been interested in agriculture and have spent time working on small farms. Besides farming, my favorite outdoor activities are skiing, running, and climbing. I look forward to living in Bozeman and getting to know the town and surrounding mountains.

Invited Talks

The recent International Congress on Plant Pathology (ICPP) was held in Boston from July 29-August 4. David Sands was one of four invited speakers in a concurrent session on Innovative Pest Control Technologies for Smallholder Farmers: Cases from the Field. The session was organized by Amer Fayad, of the Feed the Future Innovation Lab at Virginia Tech (https://vtechworks.lib.vt.edu/handle/10919/80008) and Cindy Morris from INRA in Avignon, France, an affiliate professor in our department. Dr. Sands gave an inspiring presentation on "Biological control of *Striga* witch weed in Kenya: from a toothpick to home-grown biocontrol inoculum" that generated lively debate and discussion afterwards.

Grants

Kevin McPhee, USA Dry Pea and Lentil Council (USADRY), "Pulse Crop Breeding".

Michael Giroux and Justin Vetch, American Society of Brewing Chemists (AMESOC031), "Assessment of PHS resistance candidate gene variation in barley, Hordeum vulgare L."

Cathy Cripps, Puget Sound Mycological Society, "Systematics of Russula in the Rocky Mountain alpine zone".

Publications

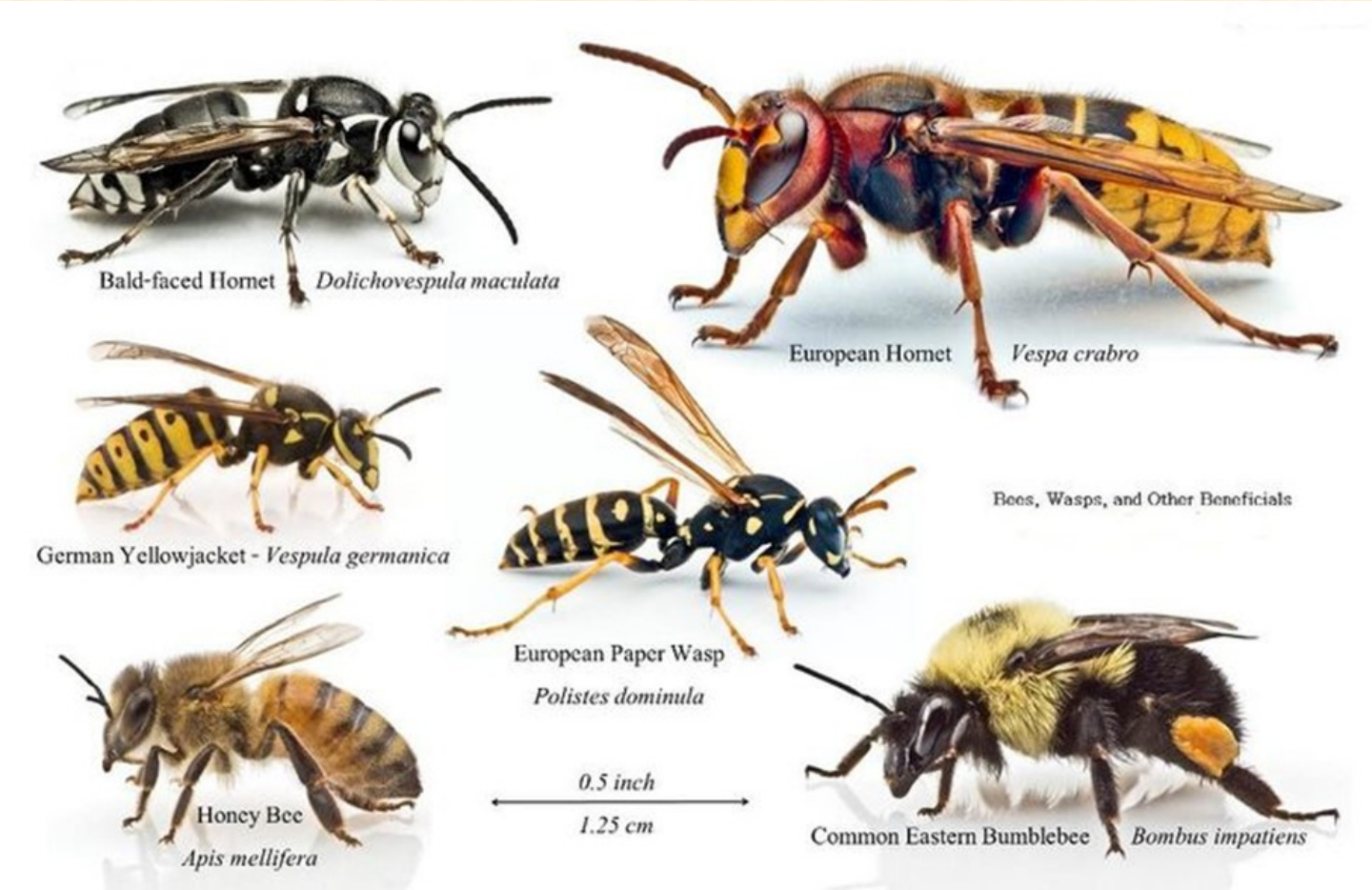
Cripps, C.L., Alger, G., and Sissons, R. 2018, "Designer Niches Promote Seedling Survival in Forest Restoration: A 7-Year Study of Whitebark Pine (*Pinus albicaulis*) Seedlings in Waterton Lakes National Park", Forests 9, pp. 14.

McMenamin, A., Daughenbaugh, K.D., Parekh, F., Pizzorno, M.C., and Flenniken, M.L. "Honey Bee and Bumble Bee Antiviral Defense", (2018), *Viruses*, 10(8), 395; doi:10.3390/v10080395.

McMenamin, A. and Flenniken, M.L. (2018). "Recently identified bee viruses and their impact on bee pollinators", *Current Opinion in Insect Science,* 26:120–129, https://doi.org/10.1016/j.cois.2018.02.009.

Brad S. Coates, Erik B. Dopman, Kevin W. Wanner, Thomas W. Sappington, "Genomic mechanisms of sympatric ecological and sexual divergence in a model agricultural pest, the European corn borer", Current Opinion in Insect Science.

Florence V. Dunkel, "The Quiet Revolution: Where Did You Come From?", Incorporating Culture's Role in the Food and Agricultural Sciences.



Bees, Wasps, and Yellow Jackets
By Toby Day, Extension Horticulture Specialist

I get several phone calls about "bees that won't leave our guests alone when we barbeque" or "there are hornets coming out from beneath my porch," or "I keep getting stung by a wasp!"

This usually requires me to ask many questions about what the bee/hornet/wasp looks like. "Is it fuzzy? Does it have long legs? Does it like your hamburger more than your guests?" These are just some of the questions I ask. Why? Because many of the people I answer questions for only really know that it "looks like a bee." Likely, it isn't a bee, but rather a bumble bee, paper wasp, hoverfly, bold-faced hornet, or the worst of them all – the western yellow jacket.

In integrated pest management, identification is paramount in making recommendations. European paper wasps are relatively harmless and can be beneficial by getting rid of cabbage loopers. They are easy to identify as they fly relatively slow and their legs usually dangle when inflight. They are easy to eliminate, if you find their nest. However, unless they are bothersome, I often let them be (no pun intended).

Bees and bumble bees are fuzzy. Neither will bother you, unless you get one caught in your clothing or really disturb their nest. Even then, bumble bees rarely sting, and I have seen bee keepers with no protection open a honey bee hive for inspection and never get stung. They really aren't aggressive. And they are excellent pollinators. If you want to see thousands of honey bees and bumblebees, just hang out in my yard for a few minutes. Yet, I have never been stung.

Bold face hornets look like yellowjackets, but are larger and have a white pattern, rather than yellow. These are often the culprits that are living in cracks in siding, in eves of homes and are normally a structural pest. They really don't pose too much of a risk of stinging but can be a nuisance. Most aerosol sprays will work on the hornets, but ultimately the nest must be removed – or they will return. This

may require opening soffits or removing the facia of a house to get to the nest.

Finally, there are western yellow jackets. They are mean, horrible creatures that sting whenever one gets close to their colony (which is often in cracks, crevices and holes in the ground). They will even station two guards at the entrance to a colony with the sole purpose of stinging you if you get too close. They are the "bee" that is trying to eat your hamburger or drink your soda when you BBQ. Unless you are willing to find the entrance to their colony and spray with insecticide (nope, nope, nope, not me – unless I can borrow David Baumbauer's bee suit); you don't have much chance of eliminating them. I have used some of the yellow jacket traps in the past. While it does cut down on the populations of yellow jackets (I think I caught 3,000 last year), I don't think it will really eliminate the colony. But it sure cut down on the numbers I had around my patio last year. And it really is satisfying to watch them all drown.

For a fun read about all things bee-like and stings, check out these two links that recently were posted on my Facebook feed (mostly non-scientific, but still good for a laugh).

https://kottke.org/18/08/a-comprehensive-guide-to-yellow-stripey-things

https://www.sciencefriday.com/segments/from-nettles-to-volcano-a-pain-scale-for-insect-stings/

Recipe of the Month

Sour Cream Enchiladas

1 lb chicken breast, diced
1 medium onion, minced
1 tablespoon vegetable oil
8 (8 inch) flour tortillas, softened
1 1/2 cups grated monterey jack cheese or 1 1/2 cups Mexican blend cheese, divided
1/4 cup butter
1/4 cup flour
1 (15 ounce) cans chicken broth
1 cup sour cream
1 (4 ounce) cans chopped green chilies or 2 fresh chili peppers

In a frying pan, cook chicken and onion together in oil over medium-high heat until chicken is just done.
Divide cooked chicken evenly between 8 tortillas; add 1 1/2 tablespoons cheese to each tortilla. Roll enchiladas and place seam-side down in a 9x13" baking dish that has been lightly sprayed with no-stick cooking spray.

Melt butter in a medium saucepan; stir in flour to make a roux, stir and cook until bubbly, and gradually whisk in chicken broth then bring to boiling, stirring frequently.

Remove from heat; stir in sour cream and green chilies. Pour sauce evenly over enchiladas.

Top with remaining 3/4 cup cheese (a baking dish may be double-wrapped and frozen at this point) and bake at 400° F for 20 minutes until cheese is melted and sauce near edges of baking dish is bubbly.

September Birthdays

Tracy Dougher	1
Laurie Kerzicnik	2
Irene Decker	5
Jennifer Lachowiec	14
Michelle Flenniken	18
Gary Strobel	23
Bill Dyer	26
Mark Young	27
David Baumbauer	27
GunNam Na	27