PSPP - Plant Science Says *May, 2019*

Graduation Ceremony and Reception
On Friday, May 3, the Plant Sciences and Plant Pathology Department will hold an awards ceremony and reception for our graduates in 108 PBB/Mathre Courtyard. The graduates will receive the following gifts: Landscape Design graduates - "The Artful Garden"; Crop Science graduates - "Endurance: Shackleton's Incredible Voyage"; Sustainable Crop Production and Plant Biotechnology graduates will receive pruning shears and Horticulture Science graduates will receive loupes (magnifying glass). All the graduates will receive a cowbell and MSU tassel bead from the College of Agriculture, as well as a coffee mug or water bottle and potted plant from the Department.

Following are the names of all those that will receive diplomas and awards.

Graduate Students
David Baumbauer - Ph.D., Plant Science
Breno Bicego - M.S., Plant Science
Andrew Burkhardt - Ph.D., Plant Science - Plant Genetics
Frank Etzler – Ph.D., Biological Sciences
Rachel Johnston - M.S., Plant Science
Joseph Kibiwott - M.S., Plant Science
Kevin King - M.S., Plant Science
Ayodeji Owati - Ph.D., Plant Science - Plant Pathology
Erich Spiessberger - M.S., Entomology

Undergraduates
Environmental Horticulture - Horticulture Science
Cameron Delaney - B.S., Honors
Sophia Koopmeiners - B.S., Honors
Joseph Lee - B.S.
Anna MacDowell - B.S., Highest Honors
Erica Melroe - B.S., Minor in Art History
Bryce Nimz - B.S.
Jared Shaia - B.S., Honors
Zoe Thorson - B.S., Highest Honors

Environmental Horticulture - Landscape Design
Leanna Martin - B.S.
Chase Shugart - B.S., Honors
Grace Slater - B.S.
Blake Stefanson - B.S.

Plant Sciences - Crop Sciences
Alyssa Brewer - B.S., Highest Honors
Nichole Clements - B.S., Honors
Alexis Clingingsmith - B.S.
Mikala Deruwe - B.S.
Robert Fowler - B.S., Honors
Danica Kluth - B.S., Honors
Randy Taylor - B.S., Honors

Plant Sciences – Plant Biotechnology
Timothy Gould - B.S., Honors
Claire Zahner - B.S., Honors, Minor in Hispanic Studies & Genetics

Sustainable Food & Bioenergy Systems - Sustainable Crop Production
Dylan Fishman - B.S., Honors

Congratulations to each of you and we wish you all the best in your future endeavors!

2019 ASHS Collegiate Scholars

The Collegiate Scholars for 2019 have been announced. This award honors the academic achievements of junior and senior undergraduates from departments of horticulture, or plant and crop science, who are majoring in horticulture.
Congratulations to each of you!

Zoe Thorson
Kaylee Tuning
John Dohner
Madeline Duke
Anna MacDowell
Esben Dedrickson-Tandy
Josey Ugrin
Cody Brandt
Evan Parsons
Cameron Skinner
Anna Hatcher
Erica Melroe

2019 ASHS Outstanding Undergraduate

This award officially recognizes exceptional undergraduate horticulture students in baccalaureate programs. This year's winner was Kaylee Tuning. Congratulations Kaylee!

2019 PSPP Student Poster Competition
Jennifer Lachowiec

The PSPP graduate students held a poster contest Thursday, April 18, 2019, as part of the annual MSU Research Celebration. Emma Jobson and Brian Ross coordinated the event as co-presidents of the PSPP Grad Club. In total, eleven graduate students participated, presenting posters capturing their latest work. PSPP faculty and staff acted as poster judges, visiting each poster presenter to hear a synopsis of their research. Judges included Jason Cook, Michelle Flenniken, Mike Giroux, Andy Hogg, Jennifer Lachowiec and Matt Lavin. In addition to the great research shared, Justin Vetch's wife, Emilie Vetch, prepared delicious, beautiful cupcakes for the event.

We are pleased to announce the following award winners, who will each receive funds for travel:
Alex McMenamin ($600)
"Honey bee antiviral defense - Detection and response to dsRNA"

Justin Vetch ($400)
"Mutations in barley genes, MKK3 and AlaAT, affect grain dormancy at physiological maturity and after-ripening"

Brian Ross ($250)
"Transcriptional responses of susceptible and extreme resistant potato cultivars after infection with potato virus Y"

For future poster presentations and competitions, the judges gave the graduate students a few guidelines for improving their presentation skills:

1. Effective posters have a clearly stated hypothesis.
2. Effective posters do not include too much text (think about a poster that you would walk by and stop to visit because a particular line of text or result caught your eye).
3. Effective posters do not have too much data.
4. Effective posters are presented in a logical order (think about "taking someone through your poster in about 3-5 minutes using your poster as the main visual aid).
5. Effective posters have informative titles, conclusions, and "take away messages" that someone can see/read from 3-4 feet away. For example, rather than having a

large "RESULT" section heading, state a major result and include the data backing that statement below each result.

We look forward to making this an annual event.

2019 Entomology Society of America Meeting
By Kevin Wanner and Ruth O'Neill

At the end of a long winter our lab (Kevin Wanner, Ruth O'Neill and Isaac Dell, Isaac is a new PhD student in my lab) was very happy to spend a few days in sunny San Diego to attend the Pacific Branch of the Entomological Society of America meeting that was held March 31st – April 3rd. I was particularly excited to visit San Diego since I had lived there for a few years in what seems like the distant past (I know, why did I leave?)! The conference was in the Mission Bay area of San Diego and it did not disappoint, including the feral parrots that I do not recall being around when I lived there. While the climate was very nice, we were there to talk about our new research on alfalfa weevil, a multistate USDA project that was funded last fall.

We hosted a half-day symposium titled "Forage Insect Pest Management in a Changing Climate: Prioritizing Future Research". The main focus of the symposium was alfalfa weevil, but presenters also covered other pests and beneficial insects in forages. Alfalfa weevil is a key pest of forage

Kevin Wanner gave a talk entitled "Revisiting alfalfa weevil biology and management in Montana: Degree-days, pestweb and genetic races".

View from our conference room for the alfalfa weevil working group meeting.

Richardo Ramirez, Utah State University, spoke on "Fitting predator phenology in alfalfa management".

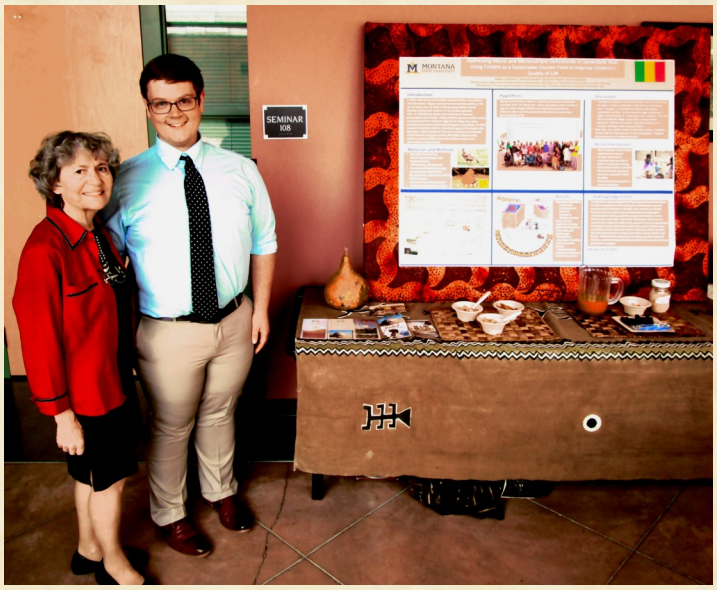
alfalfa throughout the United States. This was a great chance to get researchers from the Western region together to exchange notes. Although alfalfa weevil has been a much-studied pest for years, there is now renewed interest in research that will update and refine phenological models for the western region. This is in response to reports from the agronomic and research communities that the larvae, the most injurious life stage, appear to be feeding and developing earlier in the spring. In addition, there are reports of higher survival of overwintering eggs even in the northern part of their range.

In addition to myself, speakers at the symposium included Ayman Mostafa from the University of Arizona (talked about management of winter insect pests of alfalfa); Silvia Rondon from Oregon State University (spoke about emerging alfalfa pests in the Columbia Basin); Ricardo Ramirez from Utah State University (discussed predatory-prey phenology in alfalfa management); Rachael Long from UC-Davis Extension (presented on IPM in California alfalfa production); and Steven Price from Utah State University (talked about clover root curculio life history).

After the symposium was over, we held our first alfalfa weevil working group meeting (an activity kindly supported by the Western Region IPM Center). We were able to walk over to the conference room we rented for our working group meeting that happened to be in a Marina on the Pacific Ocean (it is San Diego after all!). And, the room for this ancillary meeting turned out to be much more affordable since it was not part of the main Hyatt Regency conference center, so it was a lucky find. Discussion amongst this group of alfalfa researchers and extension specialists from across the western U.S. was stimulating and productive. Many ideas for future avenues of research and potential project collaborations were shared. What is next? Well, the national Entomology meeting will be held in St. Louis this November, but I am pretty sure there are no feral parrots there!

Wealth Shared
By Florence Dunkel, Associate Professor

Twenty-nine students (future, current, former), faculty, friends, and family gathered 25 April in the Thayer Conference Room and Atrium for the 23rd Share-the-Wealth Symposium. Their goal was to learn the newest results of AGSC 465R students working at the nexus of health and agriculture with communities in Montana and Mali. Featured in the African community were Tanner Schmitz, graduating senior in Nutrition Science and Shelby Cerkovnik, graduating with her M.S. in Health Sciences. Overcoming grain-based diets of Bambara women and children in a rural farming community in Mali was the focus of their research: Shelby with identifying local vitamin B12 sources and how mothers' intake varied during first 1000 days paired with Tanner's study of developing participatory diagramming to mentor mothers wanting to learn cricket farming for feeding laying hens to provide eggs for their young children to prevent stunting. Featured in the Montana communities' part of the Symposium were David Todd,



Tanner Schmitz explains engagement with village women in Sanambele, Mali using wordless participatory diagramming to explain cricket farming with Dunkel.

TA Mattie Mazur and friends of T.C. Shield, listen as T.C. answers questions about her MMIWG project at the poster reception for the Share-the-Wealth Symposium.

Environmental Studies senior and T.C. Shield, a senior in Global Multicultural Studies minoring in Native American Studies. David, along with Meredith Tallbull via Polycom from Lame Deer, MT, shared with Symposium guests that the decade-long development of a Botanical Science Park for the Northern Cheyenne was, this week, enthusiastically endorsed by the Office of the President of the Northern Cheyenne Nation. AGSC 465R students provided "behind the scenes" encouragement during this past decade for Meredith by responding to his requests for help in gathering an archive of peer-refereed articles on the main medicinal plant found there and a website for use with a bluetooth device during a walk around the park. For visitors, www.nc-plantlore.org brings the Northern Cheyenne ethnobotanist and Elder, Linwood Tallbull, electronically to the park telling stories that weave history with medicinal uses of the Park's plants.

Taylor (T.C.) Shield, in contrast, chose to focus on an issue of her own people in Montana, the Amskapii Pikuni: the issue, MMIWG, Missing Murdered Indigenous Women and Girls. During the semester, T.C. found her own activist's voice and took positive action. At the Symposium, T.C. lifted awareness of us all, students, faculty, and guests, in understanding how important it is to know about these invisible statistics of the people in our State of Montana, which, as MSU's Land Grant mission, we serve.

Organic Montana-grown lentils in the McPhee's recipe for lentil soup and all the trimmings including organic veggies from the Dunkel-Diggs garden provided a great ending for the sharing of this community engagement program in PSPP at MSU.

The Buzz from the Flenniken Lab
By Michelle Flenniken, Assistant Professor

Pollinator Symposium – April 18, 2019

MSU's Pollinator Health Center and the Flenniken lab hosted a Pollinator Symposium on April 18, 2019, in Inspiration Hall of the new Norm Asbjornson Hall. This event featured short research talks by the following MSU graduate students:

- Fenali Parekh, PhD student in the Flenniken lab, "Investigating the efficacy of putative antiviral agents to limit virus infection in honey bees"

Michelle F. welcomes community members to annual Pollinator Symposium at the Norm Asbjornson Hall.

- Alex McMenamin, PhD, – "Appreciate the Little Things: Honey Bee Virology from the Colony to the Cell"
- Zoe Pritchard, Masters Student in the Ivie Lab, "The *Megachile* of Montana" "
- Will Glenny, PhD student in the Burkle Lab, "Pollinators in the Sagebrush Sea".

Pollinator films were shown and there was a Q&A session with local bee experts Michelle Flenniken, Casey Delphia (native/wild bee expert), and Steve Thornsen, commercial beekeeper and owner of the Montana Honey Company.

Julie Arnes with her poster, "A Garden for the Bees".

Johhny Dohner with his poster, "Prominent Pollinators".

In addition, students in Jennifer Britton's and Rebekah VanWieren's landscape design course presented their potential plans for a pollinator garden on the south side of Montana Hall. The event was a success, attracting approximately 80 people, most from the community beyond MSU. If you missed this exciting event this year, please mark your calendars for April 2, 2020.

The Bee Booth at the Environmental Youth Summit– April 25, 2019

Michelle Flenniken, assisted by her dad Mike, interacted with ~100 7th grade students from Big Sky, Bozeman, and Gallatin Gateway at the Gateway Youth Group's Environmental Summit Event, held at Ted Turner's Flying D Ranch near Spanish Creek on April 25, 2019. This event included a talk by local author Al Kessleheim and eight learning stations including the "bee booth". In addition to learning about bees, students interacted with the wolf and fish biologists employed by the Turner Ranch and the owners of Cowboy Cricket Farms and Harvest Farm Worms.

Some of the interesting facts we shared with the students were (1) that honey bees pollinate over 180 crops, which are valued at $17-18 billion dollars annually in North America, and (2) that Montana is a big

Michelle Flenniken educating 7th graders from around the valley at the Bee Booth at the Gallatin Valley Youth Environmental Summit.

Uta McKelvy, Noelle Orloff, and Eva Grimme exploring Indianapolis.

beekeeping state that typically ranks in the top five for honey production (e.g., in 2013, Montana ranked 2nd and produced ~15 million pounds of honey, valued at ~$30 million, and provided over 150,000 colonies for pollination services).

<u>Pollinator Garden Volunteer Days</u>
MSU's Honey Bee Research Site and Pollinator Garden upcoming volunteer days are set for Friday, May 31st 1 – 5 pm, Wednesday, June 19th 1 – 5 pm, and Monday, July 15th 8 - 11 am at the Horticulture Farm. Please email Michelle for more information – or just show up!

Uta McKelvy and Noelle Orloff learning about new research and diagnostic methods at the poster presentations. The building is an old train station that has been converted to a hotel.

National Plant Diagnostic Network Conference
By Eva Grimme, Associate Extension Specialist
In April, Noelle Orloff, Uta McKelvy, and I attended the third national conference of the National Plant Diagnostic Network (NPDN) in Indianapolis. The NPDN was established in 2002 to address the need to efficiently safeguard agriculture and natural ecosystems in the United States.

Garden at the Museum of Art in Indianapolis.

This year's conference focused on the value of accurate diagnostics, the continuing improvement of diagnostic techniques and the development of a sound strategic plan to provide a cohesive, distributed system to quickly detect and identify pests and pathogens of concern. Uta seized the moment and attended the offered fungal and bacterial pathogen identification workshops. Noelle presented a poster with the title "Educating Constituents about Herbicide Injury to Non-Target Plants," which earned positive feedback and piqued the interest of attending graduate students.

With diagnosticians from land-grant universities, regulatory officials, federal government representatives, and industry affiliates, this conference was very lively and attendees weren't afraid of voicing opinions. Presentations and poster sessions inspired numerous discussions.

The Schutter Diagnostic Laboratory is part of the Great Plains Diagnostic Network (GPDN), one of the five divisions of the NPDN. After reconnecting with our colleagues, I came to the conclusion that we are very safe in Montana when it comes to working with diagnostic samples. Fortunately, we don't find snakes (alive!) or dead rodents in our daily bounty.

Being in Indianapolis, we also had the opportunity to explore the big city. We enjoyed multiple walks along water canals in balmy spring weather and had excellent sea food. Noelle also participated in a garden tour and visited the Indianapolis Museum of Art in Indianapolis. The gardens feature 26 acres of historic estate, 26 acres of modern gardens and art museum, as well a 100-acre art and nature park. It was a rainy day but that must be a common occurrence since there were umbrellas to borrow at every building entrance or exit! One of the horticulturists at the museum led a great tour of both the historic and modern gardens. We had the opportunity to learn about the plants used in the gardens, and she had many questions for our group about plant pests.

Montana Ag Live Spring Schedule

May 5 - Darrel Stevenson, Stevenson Angus, Hobson, Montana, "Montana beef: exporting seed stock internationally".

May 12 - Jake TeSelle, Crooked Yard Hops, "The issues and rewards of growing hops in Montana".

May 19 - Matt Roschiller, Gallatin Valley Botanicals, "Farm to table: truck farm".

June 2 - Christy Clark, Montana Department of Agriculture, "The role of the Montana Department of Agriculture in agricultural entrepreneurship".

June 9 - Meta Newhouse, MSU, "MSU's role in developing educational programs designed to encourage entrepreneurship in agriculture".

2019 Field Days

June 27, NARC (Havre) – 3:30pm. Dinner included.

July 10, CARC (Moccasin) – 8:30am. Lunch included.

July 16, EARC (Sidney) – 8:30am. Lunch included.

July 18, NWARC (Creston) – 11:30am. Lunch included.

July 23, Post Farm (Bozeman) – 8:00am. Lunch included.

July 25, WARC (Corvallis) – 4:30pm. Dinner included.

WTARC (Conrad) and SARC (Huntley) host a field day every other season.

Invited Talks

Michelle Flenniken, American Bee Research Conference – January 10-13, 2019 – Tempe, Arizona, keynote presentation entitled, "The impact of viruses on honey bees at the colony, individual, and cellular levels".

Alex McMenamin, American Bee Research Conference, "Honey bee antiviral gene (AmMF116383) is important for dsRNA mediated reduction of virus in honey bees and immune cells"

Poster Presentation
Fenali Parekh presented a poster at the American Bee Research Conference, entitled "Evaluating Honey Bee- Varroa Mite Interaction"

Michelle Flenniken, Entomology Association of American Pacific Branch – April 3, 2019 "The impact of viruses on honey bees at the colony, individual, and cellular levels"

TED Talk
David Sands, TED Talk, April 28, 2019, "African Toothpick Project" The Toothpick Project is an interdisciplinary initiative that addresses the greatest pest threat to food security in Africa: Striga. Claire Sands Baker and Dr. David Sands, with partners from three continents, are utilizing Fusarium oxysporum (a host specific fungi) to eradicate Striga and protect smallholder farms.

New York Times and Climate Change
Kevin McPhee. In a recent article in the New York Times entitled "From Apples to Popcorn, Climate Change is Altering the Food America Grows", Kevin McPhee had a quote in regard to chickpeas (Montana section).

Grants
Jennifer Lachowiec, MSU INBRE, "Prediction of dependable gene promoters for edible, plant-produced vaccines

Michael Ivie, MDA, "Foundation Research for Specialty Crop Pollination Security—The (Wild) Bees of Montana

David Wheeler, Western Sugar Cooperative (WESSUG) "A Relational Database for the Montana Seed Potato Certification Program and Developing Novel Resistance to PVY through gene discovery and CRISPR"

Publications
Wheeler DL, Dung JKS, and Johnson DA. 2019. From pathogen to endophyte: emergence of an endophytic population of Verticillium dahliae in rotation crops from a sympatric population associated with wilted potatoes. New Phytologist. 222:497-510. https://doi.org/10.1111/nph.15567

Congrats and farewell to Breno Bicego
Breno recently finished his doctorate in Plant Sciences. He states, "I am really happy about my recent accomplishment, but at the same time kind of sad to be leaving Montana. I will never forget the great experience I had here and will for sure miss this place. I not only improved as a professional but also grew up as a person thanks to the fruitful interaction with good people during those years. Now I feel that it is time to move on and try new things. I am heading to Spain pretty soon. My grandpa came from Spain to Brazil and I have had the dream of living and learning their culture since I was a kid. If you are passing by, I will be glad to help with anything. See you again in the future!"

Right Plant, Right Place
By Sarah Eilers, ISA Certified Arborist and IPM Manager
People are always searching for the perfect tree. The problem with this question is that the perfect tree will depend on the setting in which it is planted. "Right Plant, Right Place" is the motto for green industry professionals. The choice of a tree for a landscape should not be taken lightly. Here are a few guidelines to consider when deciding what kind of tree to purchase and where to plant it.

Bigger is Not Always Better
A smaller tree, for instance a bare-root tree, has had less trauma than a balled and burlapped tree. It recovers quickly from transplanting and puts on substantial growth in a shorter amount of time. A bare root tree is also significantly less expensive to purchase then B&B trees and potted trees.

Right Plant, Right Place

Choosing the appropriate tree for the space can set up a tree for a long existence. A small tree, like a Japanese Tree Lilac, would be fitting for under power lines because its mature height is around twenty feet. One American Elm in maturity can provide shade for an entire residential lot and then some.

Clearance is your friend

Do not plant trees close to structures. I recommend always planting around fifteen feet from a building. Mature trees can have canopies exceeding 60'. Pruning a tree every year to keep it off your home is time consuming and hiring a service to prune is expensive.

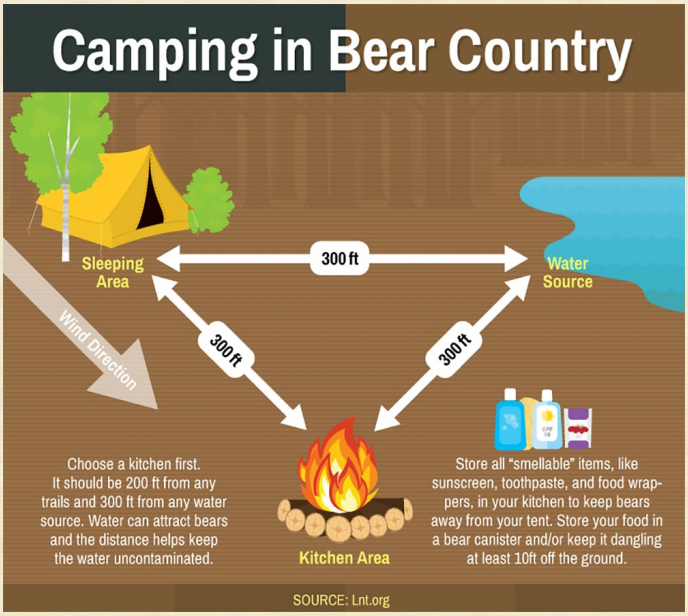
Do your Homework

Just because you like the way a tree looks at the nursery does not mean it is the right tree for you. For instance, crabapples with their beautiful display of flowers in the spring are hard to resist. The issue is the fruit in the fall that can leave sidewalks and driveways a gooey mess. Old fruit is also an attractant for nuisance pests like yellow jackets. Stick to your list. Don't let seasonal interest sway you.

Bear Safety Training
By Emma Jobson

Danielle Oyler from the Wildlife Management Institute/Montana Bear Education Working Group visited the PSPP Department on April 9, 2019. Many PSPP faculty, staff and students attended the presentation to learn more about bear safety and prepare for spring and summer adventures. Along with a lot of useful facts and information regarding bears, there was also the opportunity to learn how to use bear spray. Those who used the bear spray were surprised at how much kick there was when the spray was released so when you use it, be sure to aim low. Attendees learned several interesting facts about bears. They have a sense of smell at least

Danielle Oyler showing Greg Chorak how to use bear spray.



seven times more powerful than a domestic dog. Their sense of smell combined with their curious nature sometimes gets them into trouble when they look for food around human development. Bears consume at least 266 different species of plants, animals and fungi in the Greater Yellowstone Ecosystem. One of their favorite spring foods is the corms of western spring beauty (*Claytonia lanceolata*).

Bottom line - carry bear spray and be bear aware when you are out on adventures this spring!

Recipe of the Month

1/2 cup chopped walnuts
1 bunch spinach, rinsed and torn into bite size pieces
1/2 cup dried cranberries
1/2 cup crumbled blue cheese
2 tomatoes, chopped
1 avocado - peeled, pitted and diced
1/2 red onion, thinly sliced
2 tablespoons red raspberry jam (with seeds)
2 tablespoons red wine vinegar
1/3 cup walnut oil or olive oil
freshly ground black pepper to taste
salt to taste

Preheat oven to 375 degrees F (190 degrees C). Arrange walnuts in a single layer on a baking sheet. Toast in oven for 5 minutes, or until nuts begin to brown.

In a large bowl, toss together the spinach, walnuts, cranberries, blue cheese, tomatoes, avocado, and red onion. In a small bowl, whisk together jam, vinegar, walnut oil, pepper, and salt. Pour over the salad just before serving, and toss to coat.

May Birthdays

Hikmet Budak	1
Robyn Klein	15
Chaofu Lu	16
Mareike Johnston	22
Faye Jorgensen	23
Vinicius Ferreira	23
Durc Setzer	28
Deanna Nash	31