

October 2018

### Vision Statement

To create a diverse workforce and promote a positive work environment where all employees are respected and valued for their contributions.

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[Sherri Buxton](#), Peoria, IL, MWA Office Advisor; Employee Engagement Council

## Conference on Catalyzing Progress in Undergraduate STEM Education: Insights from Midwestern HSIs

*Submitted by Alberto Pantoja<sup>1</sup>,  
Pamela Geddes<sup>2</sup>, and  
Julio C. Puentes<sup>3</sup>*

A group of STEM faculty from Biology, Computer Science, Earth Science, Mathematics, and Physics at Northeastern Illinois University, Chicago, Illinois received funding from the National Science Foundation (NSF) to conduct a conference titled "Catalyzing Progress in Undergraduate STEM Education: Insights from Midwestern HSIs". The conference took place May 3 and 4, 2018 at the El Centro campus of Northeastern Illinois University. The main goal of the conference was to inform the National Science Foundation on the challenges, opportunities, and issues that Hispanic Serving Institutions face in STEM education of mostly underrepresented students. The NSF has solicited this feedback as they develop their new HSI program to tailor it to the needs of these institutions. Although the conference focus was underrepresented undergraduate students at Hispanic Serving Institutions, the conference provided insights to other minority serving institutions like Historically Black Colleges and Universities, Tribal Colleges and Universities, as well as institutions that are not classified as minority-serving.

The USDA, Agricultural Research Service (ARS), Midwest Area Office was represented in the panel session entitled "**STEM and Workforce Trends**". The Panel discussed current trends in different STEM jobs, skills required to enter those jobs, and gaps between what employers are looking for in new graduates and what skills those graduates possess (or lack). Panelists answered the following questions: Are we preparing students for real jobs that exist or will exist in the Midwest? What are the trends in job markets for STEM degrees? What types of industries will need employees who can step into jobs directly post-B.S., or step into them after earning a graduate degree? What are the current and near-future STEM-based trends in the Midwest's established and emerging technological, manufacturing, ag science, environmental, and pharmaceutical sectors?

Panelists from various sectors included: **Agricultural Science**: Alberto Pantoja, Associate Director, MWA USDA, Agricultural Research Service; **Biomedical and Pharmaceutical**: Jes Stephens, Scientific Recruiter, Aerotek; **Environmental**: Ron Deverman, Illinois Association of Environmental Professionals; **IT/Tech/Manufacturing**: Jorge Balestra, Director, Advanced Analytics Center of Excellence at The Kraft Heinz Company; and **Nutrition Science**: Moises Torres Gonzalez, Director of Nutritional Research, National Dairy Council.

The conference was very well attended, with a total of 159 attendees, including faculty, staff, and administrators from 4-year and 2-year institutions from the Midwest primarily. One key finding that emerged from the Panel on STEM and Workforce Trends was

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the need to start prioritizing and developing meaningful and relevant academic partnerships with industry. Many students need to get the hands-on experience that internships provide, yet there are several barriers to doing this. Sometimes, the students do not feel ready or prepared enough to go into these partnerships/internships, or if they do, they do not know what path to take to obtain these internships (many times, students are not even aware that these opportunities exist). Other times, however, there are not enough opportunities that fit the specific needs of the students. Continuing conversations about these issues between academia and industry are a must if we are to better prepare our students for the workforce.

1. Alberto Pantoja, Associate Director, Midwest Area, United States Department of Agriculture, Agricultural Research Service, 1815 North University Street, Peoria, IL 61604, [alberto.pantoja@ars.usda.gov](mailto:alberto.pantoja@ars.usda.gov)
2. Pamela Geddes, Associate Professor, Dept. of Biology and Environmental Sciences Program, Northeastern Illinois University, 5500 North St. Louis Avenue, Chicago, IL 60625, E-mail: [p-geddes@neiu.edu](mailto:p-geddes@neiu.edu)
3. Julio C. Puentes, Education, Specialist, Hispanic Serving Institutions, National Program, Office of Partnerships and Public Engagement, USDA, [Julio.Puentes@osec.usda.gov](mailto:Julio.Puentes@osec.usda.gov)

## 2018 AgDiscovery Program

*Submitted by Larla Moore*

The Crop Production and Pest Control Research Unit (CPPC) hosted 14 Ag Discovery students on Friday, July 20<sup>th</sup>. The CPPC conducts basic research investigating genetic mechanisms of disease resistance in small seed grains and oil quality in soybeans. The unit presented an introduction to plant molecular genetics and how it is being employed to improve crop health and performance. The students learned about the general principles of this field of science, the types of problems it investigates and performed some of the techniques commonly used in this the research. The students isolated DNA from strawberries using a very simple protocol that they can perform at home or their high

school classroom. After isolating plant DNA, the students learn how to make specific cuts in DNA with restriction enzymes and then join these fragments together with DNA ligase. To conclude the demonstration, the students performed gel electrophoresis to confirm that the cutting and joining reactions had occurred properly.

It was wonderful to meet these bright young people who gave two weeks of their summer holiday to learn about agricultural sciences. Hopefully, some of them may ultimately choose careers in the USDA.

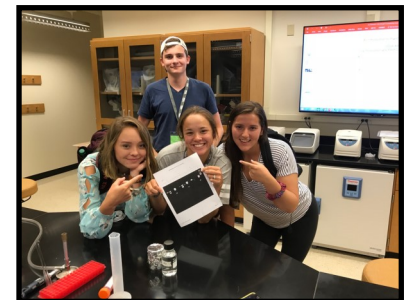
## LIBRU and the AgDiscovery Program

*Submitted by Stacey Enneking and Jeremy Marchant-Forbes*

The LBRU was excited to again host high school students as part of the USDA's AgDiscovery program. AgDiscovery is a summer camp outreach designed to help students explore careers in animal science, veterinary medicine, agribusiness, plant pathology, aquaculture, and all things agricultural. The program allows participants to live on a college campus and discover agricultural science from university professors, practicing veterinarians, industry representatives, and professionals working for the U.S. government.

To achieve these goals in 2018, the AgDiscovery program partnered with Purdue's College of Agriculture and Purdue Veterinary Medicine, as well as with all three USDA-ARS units based on campus - the LBRU, the National Soil Erosion Research Laboratory, and the Crop Production and Pest Control Research Unit. The 2-week experience immersed the participants in various fields of study with labs, workshops, and field trips, designed to give real-life experiences within Indiana agriculture and veterinary health care.

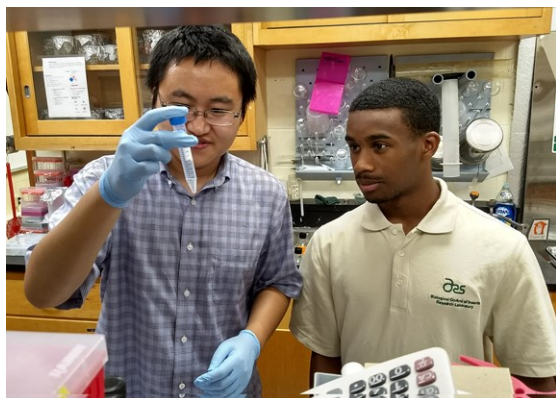
Our day with the students began with an overview of animal husbandry and handling, introducing students to practices that they used later in the day to navigate a sow around obstacles in a corral. We also visited the Purdue Dairy Unit, where Dr. Susan Eicher described how she uses a refractometer to measure the passive transfer of IgG from a cow's colostrum to her calf. In the afternoon, we discussed livestock welfare principles and how we can assess welfare in farm settings. Students then visited the Purdue Poultry Unit and evaluated the welfare of chickens in cages versus floor pens; they also compared sows housed indoors in individual pens versus outdoor group pens at the Purdue Swine Unit. Using the welfare and husbandry principles learned throughout the day, the students discussed which facilities provided better welfare for the 2 species. To wrap up, they worked in groups and developed reasons that supported their choices and then presented their reasons to the entire group.





## Let's Meet Some of the 2018 Area Funded Interns

### Aaron Lewis Working in BCIRL for a Second Summer



Dr. Hongwei Zhang (left) and Aaron Lewis preparing RNA from an insect cell line. Hongwei, who will assume a faculty position in China this August, teaches protocols in three steps, he demonstrates the protocol, observes and comments on the student performance, then has the student perform it alone.

Aaron Lewis is an undergraduate student in Lincoln University, an 1890's university in Jefferson City, MO. In 2017, RL David Stanley worked with Dr. Moushumi Paul, Science Advisor in the ARS Office of Outreach and Diversity to recruit Aaron into the University of Missouri Summer Research Internship Program. Each year the program attracts over 90 students, who live on campus, where they participate in weekly workshops and seminars, small group seminars, work

in a professional laboratory and, at summer's end, present their work at the Poster Forum. Dr. Stanley and Dr. Paul partnered to cover the costs of the internship, including housing, meals and activities, with BCIRL covering about 25% of the cost. Aaron was between his freshman and sophomore years and he learned protocols in establishing and working with insect cell lines. He presented his work on cell lines at the Poster Forum.

This year, Dr. Stanley invited Aaron back to BCIRL for a second internship and, again, worked with Dr. Paul, who contributed the lion's share of the costs and communication with Aaron. With his experiences in the classroom, Aaron is continuing his work with insect cell lines, now working with post-doctoral Associate Dr. Hongwei Zhang. They cloned a gene encoding an enzyme, catalase, that protects cells from environmental stressors. The enzyme occurs in most organisms from bacteria to humans, although it was not known whether it occurs in established insect cell lines. Aaron and Hongwei cloned the gene, developed a gene silencing construct that effectively reduced enzyme activity in the cell line and they will continue the project through the summer. This project will lead to a scientific publication with Hongwei and Aaron as co-authors.

Aaron is planning a career in veterinary medicine. His experience in molecular biology research using a cell line will enhance his competitive posture during the application process and help assure success in veterinary school.

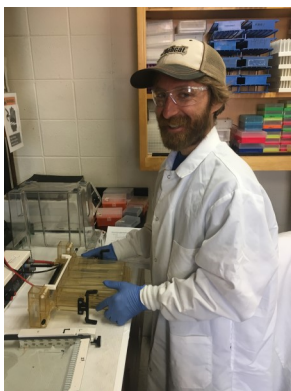
### Macie Codina, NLAE, Ames, Iowa



Hi! My name is Macie Codina and I'm an environmental science major at Iowa State University. I started working at the NLAE last August and have been fortunate enough to have the opportunity to continue my work into the summer. My main job duties include collecting and processing soil quality data and I hope to start working with an acid digestion procedure in the coming week. My favorite part of the week is going to Mead, Nebraska to collect soil and soybean data. I would highly recommend this program to others because of the experience I've been able to gain in both the field and the lab. I've met so many accomplished people and learned a great deal about what it's like to have a career in agricultural science.

## Let's Meet Some of the 2018 Area Funded Interns

### Franco Parisi, Madison, WI



The Summer Internship program was an amazing way to gain hands on experience and take part in the day-to-day processes that make up a USDA research lab. Some of the experiments I helped with were setting up controlled crosses, distinguishing male sterile and male fertile plants, and running leaf samples through the Gas Chromatography Mass Spec (GCMS) machine to measure amounts and types of epicuticular waxes. My main project was isolating DNA from around 300 onion plants. Once isolated, I used a spectrometer to measure the DNA concentrations, and then ran the DNAs on an agarose gel to visualize their quality. Next the DNA samples will be micro arrayed and genotyped, the purpose of determining the genetic basis of resistance to Fusarium basal rot and chartreuse bulb color.

- How did you learn about the Summer Internship Program?  
My boss told me about it.

- Why did you select ARS for your summer program?  
It seemed like a great way to experience the many aspects of a plant breeding program.
- What are your main job duties?  
DNA extraction for Fusarium resistance and chartreuse color.
- How are you benefiting from this experience?  
By gaining a better understanding of and practicing lab techniques.
- What do you like best?  
The people in the lab are really helpful and encourage questions. Also vortexing the PC buffer to adjust DNA binding conditions during DNA extractions is visually magical.
- Do you have any suggestions for improving the internship experience?  
Make it a longer timeframe.
- Has your vision of agriculture production or research changed since starting this experience? Why?  
Yes. I've always heard breeding takes a lot of time and effort, now I realize this is true, but it is also enjoyable.
- Based on your experience so far, are you more likely to consider a career in agricultural research?  
Yes.
- What advice can you share with others interested in this Summer Internship program?  
Take part, you may learn things you weren't even aware of.
- Would you recommend the program to others? Why?  
Yes, being part of a lab for the summer has a horizon expanding affect.

### Kelley Manbeck, Madison, WI

Kelley Manbeck has been working as a 2018 summer intern in for Shelley Jansky. Her research project has focused on a high throughput method to transition potato from the tetraploid to the diploid level. This has involved pollinations with a unique pollinator and follow-up work to collect berries and extract seeds. In addition, Kelley has been experiencing other aspects of our research program, including measuring pollen viability with a flow cytometer, collecting samples for DNA analysis, and disease resistance screening. Her favorite part of the internship experience is having her own research project. She is learning how to plan for greenhouse research, maintain healthy plants, collect data in a timely manner, and will soon have data to analyze. Kelley attended the Potato Field Day at the Hancock Agricultural Experiment Station in July, where she heard researchers

discuss their projects. This opened her eyes to the amount of research that goes into all aspects of agricultural production systems. When she started college, Kelley was considering a career in genetics, but not agriculture. However, she is learning about the many facets of plant breeding and is now open to career tracks in this field.



Kelley in the Greenhouse.



Kelley (white shirt) at field day.



## Let's Meet Some of the 2018 Area Funded Interns



**Ashley Silver, Peoria, IL**

- How did you learn about the Summer Internship Program?

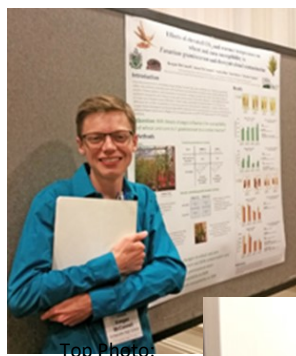
I first heard about the Summer Internship Program through a community outreach event at the Peoria Riverfront museum.

- Why did you select ARS for your summer program?  
The ARS enabled me to do research in biology, and more specifically in agriculture, which is one of my personal research interests.
- What are your main job duties?  
I perform DNA extractions, run gels, do PCRs, grow bacteria and fungi, grow wheat and help score the wheat head blight.
- How are you benefiting from this experience?  
I am receiving lab training and experience that will benefit my future academic and professional career.

- What do you like best?  
I like learning how nuanced the world really is. I find it fascinating and frustrating how little we know. I also liked the many opportunities to problem solve unexpected hang-ups.
- Do you have any suggestions for improving the internship experience?  
The Ag lab is not very well set up for interns. The paperwork takes a long time to go through which can be very frustrating. It took two weeks for me to be able to enter the building without a supervisor meeting me at the door.
- Has your vision of agriculture production or research changed since starting this experience?  
Yes. I am now more aware of how many different fields of science are involved within agriculture, and I recognize the field as having its own distinct research challenges.
- Based on your experience so far, are you more likely to consider a career in agricultural research?  
Yes I found the work very fulfilling and would be interested in doing agricultural research in the future.
- What advice can you share with others interested in this Summer Internship program?  
Sometimes the work can get frustrating but it's still totally worth it.
- Would you recommend the program to others? Why?  
Yes I had a good time, and it helped me to grow my skills and understanding of agricultural research.

### Three MPM Scientists Receive Summer Internship Awards to Support Student Research

The Midwest Area Summer Internship Program is a competitive award program that provides funding for undergraduate students to obtain meaningful work experience in a scientific, professional, or technical field. The goal of this program is to promote interest in science and in future career opportunities with ARS. Internship proposals written by three MPM scientists were selected for funding in 2018. As a result, Ms. Ashley Silver (a Biology major at the University of Tulsa) is working with [Dr. Guixia Hao](#) on a project to characterize virulence proteins from *Fusarium graminearum*; Mr. Keegan McConnell (a Biology major at Southern Illinois University) is working with [Dr. Martha Vaughan](#) on a project to determine how elevated CO<sub>2</sub> and warmer temperature will affect wheat and corn susceptibility to *Fusarium graminearum* and mycotoxin contamination; and Ms. Kelsey Roberts (a Microbiology major at Western Illinois University) is working with [Dr. Matt Bakker](#) on a project to investigate colonization of wheat plants by endophytic fungi.



Top Photo:  
Keegan McConnell  
(Martha Vaughan)



Top Photo:  
Kelsey Roberts  
(Matt Bakker)

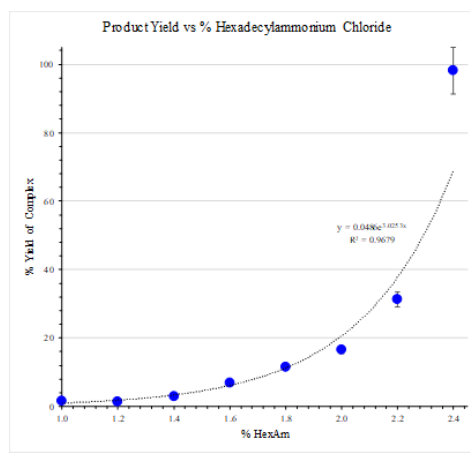
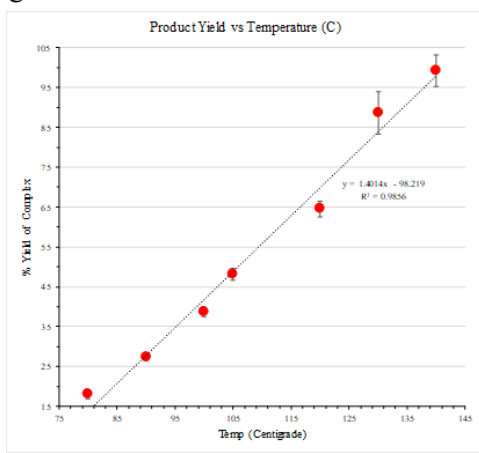


Right Photo:  
Ashley Silver  
(Guixia Hao)

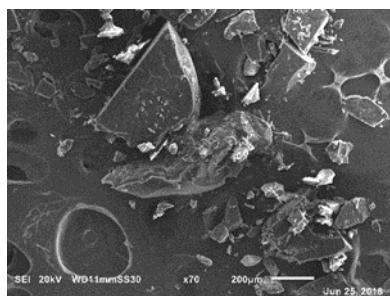
# Let's Meet Some of the 2018 Area Funded Interns

## John Rich, Peoria, IL

John Rich, a physics major from Wheaton College, came to work with researchers Dr. Gordon Selling and Dr. William Hay in the Plant polymer Research Unit. John's research primarily dealt with the synthesis of amylose inclusion complexes using microwave processing. Unlike typical industrial methods, microwave processing is a more convenient way to synthesize small amounts of complex for lab testing. This methodology is industrializable, as there are commercial microwave systems which can process 1000's of pounds per hour. The amylose inclusion complexes which John produced used high amylose corn starch and hexadecylammonium chloride as the ligand. PPL researchers have found many high value uses for these amylose inclusion complexes, but there was a gap in knowledge regarding how reaction conditions impact yield of the complex. John carried out numerous reactions using microwave radiation. John determined how the yield of complex was impacted when the following variables were altered - time, temperature, shear rate, heat input, and the amount of ligand. Detailed below are two figures detailing how the yield of product varies when temperature or the amount of ligand is changed.



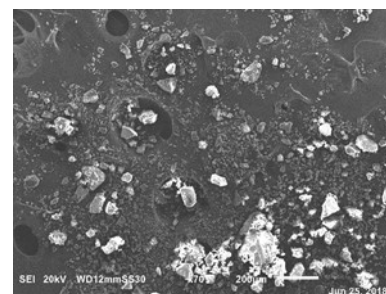
John has also performed research in the support of a joint project being carried out with Purdue University. This effort involves the use of corn protein fiber to replace wheat gluten to produce gluten free bread. Corn protein was extrusion processed to generate orientation. The extrudate was then ground using a standard mill to produce particles which were 1 mm and under. However, finer particles are needed to make bread. It was at this step that John became involved. John ground the extrudate using a cryomill which further reduced the particle size by a factor of 10x or more (see below).



Crude Corn Protein Extrudate



Cryomill

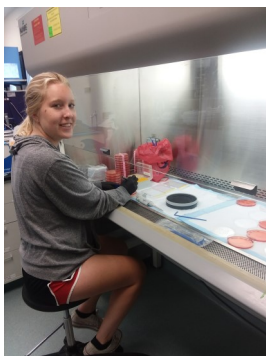


Fine Corn Protein Extrudate

Through this internship experience, John has a better appreciation for what research looks like and how it is carried out. John enjoyed defining how the yield of product responded to changes in reaction conditions and how his results defined the next set of reactions. John has also learned how agricultural research is more than carrying out field trials. While he has gotten satisfaction out of this research experience, John is more interested in the field of physics than biology or chemistry.

## Let's Meet Some of the 2018 Area Funded Interns

### Brianna Dowden, West Lafayette, IN



- How did you learn about the Summer Internship Program?  
I interviewed with the USDA and was introduced to the program when I was given the job.
- Why did you select ARS for your summer program?  
I was interested in a research program and the USDA was on the Purdue campus and I wanted to work with animals and this job allowed me to do both.
- What are your main job duties?  
I help with laboratory tasks along with helping with various research projects and with the research animals.
- How are you benefiting from this experience?  
I am learning a lot of laboratory work and rules and about how to handle animals, especially poultry.

- Do you have any suggestions for improving the internship experience?  
No, I have really enjoyed my experience and learning everything.
- Has your vision of agriculture production or research changed since starting this experience?  
My vision of agriculture research hasn't so much as changed as grown. I didn't have a lot of knowledge about the field and this job has opened my eyes to the benefits.
- Based on your experience so far, are you more likely to consider a career in agricultural research?  
Yes, I really enjoyed my summer and would love to look into further opportunities.



**We'd love to highlight your Outreach event or share your story.**

**Contributions can be sent to your location ODEO representative listed on the front page below the vision statement.**

## Special Emphasis Programs/Observances/Resources and Information

Special Emphasis Programs (SEPs) are an integral part of the overall civil rights, human resources and program delivery functions. The purpose of the SEPs is to provide oversight, guidance, direction, enforcement and assistance to enhance opportunities for women, minorities, and people with disabilities in all employment and program delivery activities.

**Employment activities:** Recruitment, hiring, promotions, separations, awards, training, or any other employment action which impacts on the inclusion of and equal opportunity for women, minorities, and people with disabilities.

**Program delivery activities:** These activities include outreach, training, public notification, program accessibility or any system, practice or procedure or other activity which increases the knowledge of and participation by women, minorities, and people with disabilities.

### November - American Indian Heritage Month

**National Theme:** "Honor the Past—Be the Future"

**Resources & Information:** USDA Employee Resource Group: Society of American Indian Government Employees (SAIGE)  
Ms. Kelly Williams, President  
Phone: (504)286-4526; email: [Kelly.williams@ars.usda.gov](mailto:Kelly.williams@ars.usda.gov)

The National Congress of American Indians  
[www.ncai.org](http://www.ncai.org)  
Phone: (202) 466-7767

U. S. Department of the Interior Indian Affairs Document Library  
<https://www.bia.gov/DocumentLibrary/index.htm>

[Tribal Leaders Directory](#)

nativeculture.com  
[www.nativeculture.com/learn/](http://www.nativeculture.com/learn/)

[Native American Cultural Exhibit; Native American Videos](#)

### November 11—Veteran's Day

**November 12—Veteran's Day Observed (Federal Offices Closed)**

**National Theme:** "Honoring Courage, Valor, and Sacrifice"

**Resources & Information:** U. S. Department of Veterans Affairs  
<http://www.a.gov/opa/vetsday/>  
Email: [vetsgay@va.gov](mailto:vetsgay@va.gov)

Operation We Are Here (Resources for military community and supporters)  
<http://www.operationwearehere.com/VeteransDay.html>

Veterans History Project  
<http://www.loc.gov/vets/>

Mary Weber, ARS Veterans Employment Officer  
Email: [mary.weber@ars.usda.gov](mailto:mary.weber@ars.usda.gov); Phone: 301-504-1397





Additional resources for diversity awareness material and ideas for special observances (catalog, pins, videos, etc.) are available from the following resources:

**ARS EEO Video Library:** <http://www.afm.ars.usda.gov/ODEO/files/ARS%20Video%20Library%20Catalog1.pdf>

**Diversity Store:** [www.diversitystore.com](http://www.diversitystore.com); Phone: 800-200-5964; Email – [hmsdc@aol.com](mailto:hmsdc@aol.com)

**Smithsonian:** <http://www.si.edu/>; Phone: 202-633-1000; Email: [info@si.edu](mailto:info@si.edu)

**USDA Department-wide Monthly Observances – Links for Websites:** <http://www.dm.usda.gov/employ/observances.html>

Observance events/activities should be conducted in a most cost-efficient manner.



**You can earn credit for diversity training when you participate in a Special Emphasis Observance event (i.e., Women's Equality Day, Veterans Day, etc.).**

- ◆ How? There are two options, as applicable:
  1. Record your own learning in AgLearn if the learning item allows users to do so upon completion of the learning item. Access AgLearn and go to Record Learning.
  2. Contact your Designated Location AgLearn Administrator or Debra Owens-Coleman, Acting MWA Outreach, Diversity and Equal Opportunity Program, at [debra.owenscoleman@ars.usda.gov](mailto:debra.owenscoleman@ars.usda.gov) or 979-260-9416.

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**REE Mission Area EEO Counseling:** 202-720-3410, 800-340-4289, TDD: 202-720-3303

<http://www.ars.usda.gov/AboutUs/docs.htm?docid=23089>; Axon: <https://axon.ars.usda.gov/ODEO/Pages/Home.aspx>

**Cooperative Resolution Program:** Jeff Schmitt; 301-504-1352, [jeff.schmitt@ars.usda.gov](mailto:jeff.schmitt@ars.usda.gov) or [coopres@ars.usda.gov](mailto:coopres@ars.usda.gov)

<http://www.ars.usda.gov/odeo/coopres>; Axon: <https://axon.ars.usda.gov/ODEO/Pages/Home.aspx>

**Reasonable Accommodation Program:** Tonya B. Morris, 301-504-4339, [tonya.b.morris@ars.usda.gov](mailto:tonya.b.morris@ars.usda.gov)

<http://www.ars.usda.gov/AboutUs/docs.htm?docid=23085>; Axon: <https://axon.ars.usda.gov/ODEO/Pages/Home.aspx>

**Outreach and Recruitment Branch Area Contact:** Debra Owens-Coleman, 979-260-9416, [debra.owens-coleman@ars.usda.gov](mailto:debra.owens-coleman@ars.usda.gov).

<https://www.ars.usda.gov/AboutUs/docs.htm?docid=23072>; Axon: <https://axon.ars.usda.gov/ODEO/Pages/Home.aspx>

**Office of Outreach, Diversity, and Equal Opportunity (ODEO) Home Page:**

<http://www.ars.usda.gov/ODEO> Axon: <https://axon.ars.usda.gov/ODEO/Pages/Home.aspx>