In This Issue:
Graduates
Awards
Edible Cottonseed
Double Haploid Wheat
Hemp guidelines released
Kochia research
more

Happy Holidays!
A new decade is upon us!
As we wind up this semester, we begin to look forward to the new Twenties. They may not be roaring, but we anticipate the next ten years will be full of research advancements and fresh ideas.

We close out the teen years with a new tool in the fight for global food security. Ultra-low gossypol cottonseed may one day help to feed millions (See story page 3). Double haploid wheat bred by Dr. Chenngen Chu and our wheat team may also help provide sustenance to many as it helps researcher find superior varieties more rapidly (See story page 5). The twenties should also see a push toward soil health and soil security which will help us protect the soil that provides so much for us. To guide us in this process we will be developing a strategic plan through our faculty retreat next week.

We applaud our graduating seniors and those earning advanced degrees. They will now set forth to help bring about some of those anticipated advancements. We wish them all a great deal of success.

One of Dr. Jacqui Aitkenhead-Peterson’s seniors spent the year working on an urban tower garden funded through a sustainability grant. That garden provided fresh produce for Aggie students. You can read more about it on page 5. This is an example of how experiential learning benefits our students.

The Texas Department of Agriculture is developing the first set of rules governing industrial hemp growth in Texas. These are based on federal rules that are summarized on page 6. Congratulations to all who participated in the tri-societies meetings in November. We appreciate the efforts that you make to share your research at these events. Many came home with awards – Kudos to you all. Many of our faculty participated in the Amarillo Farm and Ranch Show, Cotton State Support Conference, Texas Plant Protection Assn. Conference and Winter Turfgrass Conference.

I have also been engaged with the Council for Science Society Presidents, NAREEE and Cast activities. Our regional and county extension meetings are also in full swing. Lots of miles and lots of information to share from hemp to weed control and soil health to variety recommendations. Kudos to all the science behind these sessions.

We are currently recruiting for four positions, three of which will have candidates interviewing in the next two weeks. It will be exciting to have five seminars over the next two weeks as we also wrap up the semester with our faculty retreat Dec. 16-18. We look forward to seeing all our faculty there.

The department will be closed from December 21 through January 2 for the winter break. Then the New Year starts with a bang as both the AgriLife Conference and Beltwide Cotton Conference take place the first week we are back.

We wish you all a very happy holiday season and the best in the new year!

You can support Soil and Crop Sciences research, teaching and extension outreach with your tax-deductible donations.

More Information can be found at:
http://soilcrop.tamu.edu/giving/
The U.S. Food and Drug Administration has given the green light to ultra-low gossypol cottonseed, ULGCS, to be utilized as human food and in animal feed, something Texas A&M AgriLife researchers have been working on for nearly 25 years.

Keerti Rathore, Ph.D., a Texas A&M AgriLife Research plant biotechnologist in the Texas A&M Institute for Plant Genomics and Biotechnology and Department of Soil and Crop Sciences, College Station, and his team have developed, tested and obtained deregulation for the transgenic cotton plant – TAM66274.

TAM66274 is a unique cotton plant with ultra-low gossypol levels in the seed, which makes the protein from the seeds safe to consume, Rathore said, but also maintains normal plant-protecting gossypol levels in the rest of the plant, making it ideal for the traditional cotton farmer.

Patrick Stover, Ph.D., vice-chancellor and dean for the College of Agriculture and Life Sciences and director of AgriLife Research, said this is research with a direct, positive impact on the world’s food supply.

“This demonstrates how we can make a difference in enhancing the nutritional quality of the food system for those in greatest need, while enhancing the profitability of agriculture production,” Stover said. “Our goal is to advance sustainable agriculture in Texas and around the world, and this new protein source is yet another step in that direction.”

Cottonseed as a food source

If adopted by the cotton growers worldwide, ULGCS has the potential to make a significant impact on nutrition security, especially in the poor, cotton-growing countries, Rathore said.

“The amount of protein locked up in the annual output of cottonseed worldwide is about 10.8 trillion grams,” he said. “That is more than what is present in all the chicken eggs produced globally, and enough to meet the basic protein requirements of over 500 million people.”

This FDA approval is only the fifth for a university-developed, genetically engineered crop in the 25-year history of genetically modified products in the U.S., and is the first for a Texas university, Rathore said.

Except for a few countries, most cotton producing countries, particularly in Asia and Africa, suffer from hunger and malnutrition, Rathore said. Up to now, the ability to utilize protein-rich cottonseed for food or even as feed for the non-ruminants was not possible because of the presence of a toxic terpenoid, gossypol.

With the development and approval of the ULGCS, gossypol is no longer a deterrent.

The human food ingredients from TAM66274 cottonseed can be roasted cottonseed kernels, raw cottonseed flour and cottonseed oil.

Step to a new protein source

Getting to this point took approval from two areas of government. First, non-regulated status for TAM66274 was required by the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service. Then, FDA approval was needed.

“This approval from FDA enables cultivation and use of this promising new cottonseed product within the U.S.,” Rathore said.

The research was supported by funds from Cotton Inc. and AgriLife Research.

Kater Hake, Ph.D., vice president of agricultural and environmental research at Cotton Inc., said gossypol suppression in cottonseed has been part of their funded research portfolio for over 30 years.

“It took time to tap the innate protein potential in the seed; time for the right technologies to develop; and time for
the right research team to come along.”

**Building a market**

The next step, Hake said, is to get cotton farmers and the industry around the world to begin growing and marketing the special variety.

Tom Wedegaertner, director of cottonseed research and marketing at Cotton Inc., explained the dedication to this research project, saying gossypol in the leaves and stalks of the cotton plant serve as a pest deterrent, but its presence in the seed serves no purpose.

Hake said with the full deregulation approval in place, “We can now demonstrate the value of a novel food source to cottonseed processors and seed companies who are essential to purchasing and delivering the seed to cotton growers.”

**More bang for the cotton buck**

With expanded use of ULGCS for human nutrition either directly as food or indirectly as feed, the cotton plant can potentially become a dual-purpose crop that will be cultivated not only as a source of natural fiber, but just as much for its seed to be used as a source of oil as well as protein, Rathore said.

Importantly, he said, the ULGCS makes available a vast source of protein without bringing additional land under the plow or an increase in the input costs.

Another potential benefit, Rathore said, is that ULGCS, by serving as a substitute for fishmeal, will positively impact the environment by reducing pressure on the severely strained supply of small, wild-caught ocean fish used as a source of feed in fish farms.

Also, by serving as a source of protein, it could reduce agricultural land-clearing in the Amazon and other places to provide space to grow more soybeans to satisfy the rising demand for protein for the growing population.

“Thus, we believe ULGCS represents a unique biotech trait that will benefit farmers, the cottonseed processing industry, the environment and human health,” he said.

**Reducing malnutrition**

Ultimately, though, Rathore’s goal is for global adoption of TAM66274 to help address protein malnutrition in impoverished parts of the world that cultivate cotton.

Human nutrition trials conducted in some Central and South American countries, Western Africa, Asia and the U.S. in the 1960s through the 1980s show that with substantial reduction or complete elimination of gossypol, cottonseed protein can play a direct and significant role in alleviating protein-calorie malnutrition in a populace suffering as a result of inadequate nutrition.

“It is my hope, as we move forward in the commercialization process, that the protein derived from ULGCS remain affordable as a supplement in protein-poor diets,” Rathore said.

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**Turfgrass Science students take time to volunteer**

Earlier this semester, members of the Turfgrass Club gathered at the new home of The Arts Council of Brazos Valley to help landscape the new building.

The students volunteered their time to lay sod which had been donated by Tritex Turf.

Students in the Turfgrass Club perform at least one local volunteer activity each year, as well as volunteering at golf and turfgrass industry meetings.
When new pests, diseases or environmental issues are identified in Texas wheat, expertise in doubled haploid development can help find solutions in less than half the time of traditional breeding practices.

Chenggen Chu, Ph.D., a geneticist, joined Texas A&M AgriLife Research's wheat program at Amarillo two years ago, and his doubled haploid wheat pure lines are already making it to field yield trials this fall.

Since moving to Amarillo, Chu has built a wheat doubled haploid production pipeline from scratch that can be shared with AgriLife Research's wheat breeding programs in both Amarillo and College Station. He is training other personnel on the process.

The major advantage of using doubled haploid plants is to shorten time in developing genetically pure lines from five to six years in a traditional winter wheat breeding scheme, to only two or three years, said Shuyu Liu, Ph.D., AgriLife Research wheat geneticist, Amarillo.

“Texas A&M’s wheat breeding programs are very strong, but did not include anyone with the skills Dr. Chu brought with him,” Liu said. “The wheat doubled haploid line development procedures require some skilled steps in the laboratory.

“It also requires a special growth room and lab equipment for inducing haploid embryos, growing plants from young haploid embryos, doubling chromosome numbers to bring back the fertility, and recovering plants to grow in soil for seed production.”

What is doubled haploid?

Traditional wheat two sets of chromosomes (genetic material from both parents). This is called a diploid. In the general procedure for wheat doubled haploid production, corn was used as the father to pollinate the mother wheat plants.

During embryo development, only the chromosomes from the wheat mother plant are kept. These embryos with a single set of chromosomes are haploids and are highly sterile, producing almost no seed.

However, through an induced chromosome doubling process – the skill that Chu brings to the program – the haploids can produce another copy of chromosomes in each cell, bringing the chromosome numbers back to the normal two sets per cell and fully restoring their fertility.

This doubled haploid process turns the haploid to the regular diploid with two sets of chromosomes that are identical. The identical sets of chromosomes in each cell makes doubled haploid lines 100% genetically stable, even after being reproduced for many generations.

“This genetic stability, regardless of time and location, makes trait evaluation more accurate and reliable for breeders,” Chu said.

Doubled haploids in the field

Chu has been able to optimize the procedures to increase efficiencies on both haploid plant induction and chromosome doubling. He led the genetic team working with Texas A&M's two wheat breeding programs in College Station and Amarillo, and he produced more than 1,300 doubled-haploid lines in the first season from about 40 crosses.

The team has now finished the second season and harvested over 700 lines. The first set of 550 lines were increased for seed in Yuma, Arizona, and have been planted in multiple locations this fall for yield trials.

Liu said the process isn't without challenges, as with any crop. The 2018 summer was very good for growing doubled haploid plants in the greenhouse in Bushland, but this past summer many plants failed to produce enough tillers due to the stressful, hot environment.

Next steps

“We would like to keep the trained personnel and established procedures and a facility to continue doubled haploid production to meet the requirements from both breeding and genetic research,” Liu said. “But that takes funding.”

He said they are currently working on two U.S. Department of Agriculture-National Institute of Food and Agriculture projects where doubled haploids are involved to develop pure lines with target genes.

At the same time, Chu is working to optimize the procedures further to increase the efficiency of doubled haploid development.

“We greatly appreciate the funding support from the Crop Improvement Program of Texas A&M AgriLife Research during the last two years and the continuous support from Texas Wheat Producers Board,” Liu said.

Such funding, he said, will be key to keeping skilled technicians and a facility with controlled light and temperature conditions in place.
The wait is over, and the first look at the U.S. Department of Agriculture’s interim final hemp production rules are now available. The rules were published in the Federal Register on Oct. 31 and public comment will be allowed for 60 days on the USDA website.

These rules do not, however, grant anyone the right to begin planting hemp in Texas. There are still several more steps to the process to finalize Texas industrial hemp rules, according to Texas A&M AgriLife Extension Service specialists working with hemp.

Hemp refers to the Cannabis plant with tetrahydrocannabinol, THC, concentration of not more than 0.3 percent on a dry-weight basis. Cannabidiol, or CBD, is the most referenced product aligned with hemp production, but non-consumable hemp products include cloth, cordage, fiber, fuel, paint, paper, particleboard and plastics.

USDA hemp rules prompt Texas action

Tiffany Dowell Lashmet, AgriLife Extension agricultural law specialist, Amarillo, said a significant portion of the USDA rules tell tribes and states who are outlining their own hemp production plans what must be included. Another portion puts in place rules for producers in states or tribes that don’t want to create their own plan.

Texas, through the Texas Department of Agriculture, will be submitting a state plan, which must be approved by USDA. Until that happens, no physical procurement of hemp seed, planting or production is allowed in Texas, said Calvin Trostle, AgriLife Extension agronomist, Lubbock.

AgriLife Extension is gearing up to help producers work through the regulatory compliance and production processes.

Once the approved TDA rules are released, there will be requirements for an application and licensing process, fees for application and inspections, notification, rules to govern how industrial hemp will be tested in the field and more.

Production and testing will center on the acceptable hemp THC level, which is 0.3% taking into consideration the measurement uncertainty. Anything testing above the limit will be regarded as ‘hot’ or marijuana and could be subject to destruction.

Texas hemp rules timeline

TDA general counsel Tim Kleinschmidt said while the rules and regulations process might be wrapped up by February, it will likely be March before they are ready to begin taking applications for licenses and permits. The statute allows them 60 days to process a license.

He said they expect to file the Texas rules in early December and then must leave the comment period open for 30 days.

“If all goes well and once we adopt rules, it is 20 days before they are effective, which takes us into February,” he said.

Trostle said this timeline makes it questionable whether anyone will be ready for a March-April planting window that might be needed. And then the question will remain as to where and how the hemp will be processed.

https://www.youtube.com/watch?v=xUApP4MrvBY

Read the rules

Lashmet suggested producers who hope to grow hemp read up on a few important segments of the rules, including:

– Personal and production information required by the government regarding expected hemp production.
– Sampling and testing for the “acceptable hemp THC” level.
– Repercussions for crops that exceed that THC level and the requirements for destruction if required.

“It’s not as simple as you might think,” Lashmet said. “There are some provisions under the Controlled Substances Act and Drug Enforcement Agency regulations that will have to be followed for destruction.”

Financial risks of hemp production

Justin Benavidez, Ph.D., AgriLife Extension economist, Amarillo, also pointed out the cost and benefits section the rules, which indicate just how much risk is involved in growing hemp.

The rules outline some overall U.S. averages for what costs and returns are for different types of hemp production, Benavidez said.

“Keep in mind, these are not Texas A&M AgriLife budgets,” he said. “These are not saying what the costs and returns will be in Texas. This is a highly aggregated average from USDA sources.”

USDA published the cost of production per acre as $19,000 per acre. This is considerably higher than the $670-per-acre variable cost for corn and cotton in the High Plains.

Overall revenues outlined in the USDA rules vary depending on the production model, but as far as net returns, they range anywhere from negative $25,000 per acre up to a positive $7,000 per acre, he said. The range depends on whether it is a floral production, grain or fiber model.

Trostle said the higher side of USDA’s production figures are likely to be costs for smaller scale, high CBD production hemp.

“There’s a lot of risk involved, and it’s certainly something to think about when you are going forward with that hemp production model,” Benavidez said. “If you are seeing a $19,000-per-acre investment on the side of production and then are forced to destroy it because of THC levels, that is something to keep in mind.”
Experiential learning enhances a student’s college experience and is a required part of the curriculum for undergraduates in the Department of Soil and Crop Sciences. The department offers internships and study abroad opportunities to help students meet this requirement. Broch Saxton, one of the Department of Soil and Crop Sciences December graduates, created his own internship as a student leader and greenhouse project director with TAMU Urban Farm United (TUFU).

TUFU is an urban farm that utilizes vertical towers -- Tower Garden -- that produce high value/specialty crops in a space-conscious technique via hydroponic growing methods. The project started by Broch is housed in a greenhouse on the Texas A&M campus. It currently includes twenty-four towers on which a variety of produce was grown, and plenty of room to expand.

The urban farm project began as a collaboration between Saxton and Lisette Templin, an Instructional Assistant Professor from the Department of Health and Kinesiology. “I have dreamed of running greenhouses in this form. Using the knowledge obtained from my degree, I want to help people have better access to greater food, all while engraining hydroponic farming into the university. My experience in this process has been completely driven by networking and passion. This, is what I want a career in,” said Saxton, who received his Bachelor’s degree in Plant and Environmental Soil Science Dec. 13.

“Hydroponics have huge potential to benefit many people,” he said. “When I approached the Texas A&M Office of Sustainability with my idea of a vertical farm project, they suggested I partner with Ms. Templin, who had approached them with a similar idea.” Templin has a tower garden on her patio which feeds her family of four. She and Saxton envisioned a project that could potentially feed Aggie students and staff on campus. They submitted an abstract to the Aggie Green Fund and in January 2019 received a $60,000 grant and permission to use space in a greenhouse owned by the Department of Plant Pathology and Microbiology.

With the grant funds, Saxton and Templin purchased towers and the closed-loop watering system that provides nutrition to the plants, as well as 800 seedlings from an urban farm in Austin to use for their initial crop. They will be self-sufficient and seed their own plants for future endeavors.

The first crop included four different types of lettuce, kale, snap peas, snow peas, herbs, chard, bok choi, tatsoi and celery. They plan to expand the project to include peppers in the next round.

Each tower is managed individually to ensure that the pH of the water is appropriate for the stage of growth, and that the nutritional requirements of each plant are met.

Since it is an internship, and Saxton received college credit for his time with TUFU, he needed an advisor in the department. He reached out to Dr. Jacqueline Aitkenhead-Peterson.

“I had taken courses under Dr. Peterson and was impressed by her value as a teacher and her approach to education,” Saxton said. “She has the mentality of mentorship and guidance that I was looking for.” Aitkenhead-Peterson was happy to serve as Saxton’s advisor for the project.

“The fact that this project was not research based was very unusual to me” she said. “However, this project is about feeding people and educating people on the possibilities of feeding themselves which I deemed to be a very important exercise.”

Produce harvested by TUFU was distributed by the 12th Can Food Pantry, a student-run program on the Texas A&M campus which serves all students, faculty and staff in need of assistance.

TUFU looks forward to continuing to support the 12th Can and hopes to expand to support student dining.
Congratulations!

to each of our students who received an advanced degree this month!
We are proud of you for the efforts you have made and wish each of you the very best in the next phase of your life!

Agronomy

Dorothy Menefee

Dorothy earned her Ph.D. in Agronomy under the supervision of Dr. Nithya Rajan. Her research focused on modeling carbon and water vapor fluxes in corn and cotton production.

She has accepted a position at the USDA-Agriculture Research Service station in Temple, Texas, as a Biogeochemist Post-Doc.

Soil Science

Dianna Bagnall

Dianna earned her Ph.D. in Soil Science under the supervision of Dr. Cristine Morgan.

She has accepted a position as a research soil scientist for the Soil Health Institute.

Dianna’s research included the development of a soil scanning methodology to promote soil health and preserve

Gregory Rouze

Gregory has earned his Ph.D. in Soil Science under the supervision of Drs. Cristine Morgan and Haly Neely. His research focused on the integration of drone technology in agriculture.

He has accepted a position as a scientist at the United States Geological Service Eros Center in Sioux Falls, SD.

Marie Schirmacher

Marie has earned her Master of Science in Soil Science under the supervision of Drs. Paul DeLaune and Terry Gentry. Her research focused on soil health and cover cropping systems.

She will be moving back to her native Virginia, and pursuing employment opportunities in the Mid-Atlantic region.
**Food Science and Technology**

**Shreeya Ravisankar**
Shreeya earned her Ph.D. in Food Science and Technology under the supervision of Dr. Joseph Awika.

**Molecular & Environmental Plant Sciences**

**Kevin Babilonia**
Kevin earned his Ph.D. in MEPS under the supervision of Dr. Ping He in the Department of Biochemistry and Biophysics.

**Jingwen Guan**
Jingwen earned her Ph.D. in MEPS under the supervision of Dr. Lanying Zeng in the Department of Biochemistry and Biophysics. Her research focused on bacteriophages and CRISPR-Cas systems. She is currently interviewing for postdoctoral positions.

**Cooper Svajda**
Cooper earned his Master of Science in MEPS under the supervision of Dr. Michael Thomson. His research focused on CRISPR modification of rice protoplasts. He is currently working as a greenhouse manager and research assistant for the Department of Plant Pathology and Microbiology here at Texas A&M University.

**Jie Tian**
Jie earned her Ph.D. in MEPS under the supervision of Dr. Hongmin Qin in the Department of Biology. Her research investigated the means by which O-GlcNAcylation levels regulate primary ciliary length in mammalian cells and explored the use of Chlamydomonas reinhardtii as a template to synthesize biomolecules. She has accepted a position as a Postdoctoral Research Associate AD at the University of Georgia Complex Carbohydrate Research Center.
Christian Hitzelberger
Christian earned his Master of Science in Plant Breeding under the supervision of Dr. David Stelly. His research focused on germplasm introgression, specifically the development and characterization of chromosome segment substitution lines in cotton.
He will remain at Texas A&M University to pursue his doctoral degree focused on improving fiber quality and disease resistance in cotton.

Holly Lane
Holly earned her Master of Science in Plant Breeding under the supervision of Dr. Seth Murray. Her research focused on applications and evaluations of phenomic technologies in maize breeding.
Holly is currently interviewing, with the hope of returning to the classroom in the future to pursue a Ph.D.

Jeremy Stiles
Jeremy earned his Master in Plant Breeding through the distance education program under the supervision of Dr. Steve Hague.
He will continue working as a crop consultant at Nutrien Ag Solutions.

Alexandra Ullrich
Alexandra earned her Master of Science in Plant Breeding under the supervision of Dr. C.Wayne Smith.
She will be remaining at Texas A&M to pursue her doctoral degree.

Gulten Girgin
Gulten earned her Master of Science in Plant Breeding under the supervision of Drs. Russ Jessup and James Muir. Her research focused on the influence of pH on forage yield, nutritive value, and seed production of native perennial herbaceous legumes, specifically Dalea multiflora (Roundhead prairie clover).
Students earning a Bachelor of Science Degree from the Department of Soil and Crop Sciences - Dec. 13, 2019

Lisette Rose Aeschlimann
PSSC - soil and water emphasis

Joseph Brayden Beal
PSSC - crops emphasis

Zachary Daniel Godfrey
Turfgrass Science

Leonard Eugene Herndon
PSSC - crops emphasis

Blake Joseph Janysek
PSSC - crops emphasis
Minor - Business

Emily Knight Hunter
PSSC - soil and water emphasis

Regan Leigh Lindsey
PSSC - crops emphasis

Lucas Ryan Miller
PSSC - crops emphasis

Nicholas Paul Patschke
Turfgrass Science
Minor - Agronomy

Garrett Scott Reed
PSSC - crops emphasis
Minor - Business

Marina Leigh Rismiller
PSSC - crops emphasis
Minor - Poultry Science
Minor - Horticulture

Broch Lawhorn Saxton
PSSC - crops emphasis
Minor - Horticulture

Hyunseung Seo
PSSC - crops emphasis

Morgan Hailey Swoboda
Double major
PSSC - crops emphasis
and Entomology

Davis Michael Wagner
Turfgrass Science

Calvin James Wilson
Turfgrass Science

Jonathan Andrew Wolf
Turfgrass Science

*PSSC - Plant and Environmental Soil Sciences

Students earning a Minor from the Department of Soil and Crop Sciences - Dec. 13, 2019

Shelby Cristina Aceto
Agricultural Business
Minor - Agronomy

Joshua Calvin Hitchcock
Agriculture Economics
Minor - Agronomy

Camille Louise Jones
Ag Leadership & Development
Minor - Agronomy

Mason Lynn Marshall
Ag Leadership & Development
Minor - Agronomy

Nolan Samuel Self
Bioenvironmental Science
Minor - Environmental Studies

Cody Wayne Smith
Horticulture
Minor - Plant Breeding
Minor - Entomology
Faculty and students shine in competitions

Many faculty, staff and students participated in the annual meetings of the Agronomy Society of America (ASA), Crop Science Society of America (CSSA) and the Soil Science Society of America (SSSA) recently in San Antonio. Some presented research posters, others gave oral presentations of their research, and many brought home awards from their respective competition category.

At the ASA meeting:
Dr. Vanessa Corriher-Olson, Associate Professor and Extension Specialist in Overton, earned two Extension Education Community Awards. Her website/RSS feed “Foragefax” earned the award in the Digital Communications category, and her spreadsheet “2019 herbicide and Insecticide Cost per Acre” earned the award in the Digital Decision Aids category.

Joseph Burke, a Ph.D. student studying Soil Science under Drs. Katie Lewis and Julie Howe, placed first in the Cover Crop Community oral competition.

Philip Hinson, a Ph.D. Agronomy students under Drs. Curtis Adams and Nithya Rajan, claimed third place in the Nutrients and Environmental Quality oral competition.

Reagan Hejl, a Ph.D. student studying Water Management and Hydrological Science under Dr. Ben Wherley, placed second with his poster in the Golf Research division.

Mark McDonald, who is working on his Ph.D. in Soil Science under Drs. Katie Lewis and Terry Gentry, placed 2nd in the Soil C and GHG Emissions Community oral competition.

Dorothy Menefee and Jeffery Siegfried tied for first place in the Airborne and Satellite Remote Sensing Oral Presentation Competition. Both are Ph.D. Agronomy students under Dr. Nithya Rajan.

Spencer Samuelson, a Ph.D. student in Agronomy under Dr. Muthu Bagavathiannan, place third in the Organic Systems Management poster competition.

Biswa Sapkota, who is working on his Ph.D. in Agronomy under Dr. Bagavathiannan, topped the field in the Precision Agriculture Systems in Agronomic Productions Systems oral presentation.

Binita Thapa, a Ph.D student in Soil Science under Dr. Jake Mowrer, tied for 3rd place in the Biochar for Agronomic and Environmental Uses student competition.

At the CSSA meeting:
Alper Adak, a Ph.D. student in Plant Breeding under Dr. Seth Murray, claimed first in the C1-Crop Breeding and Genetics poster competition.

Will Bowling and Bob Chang each won a 2019 Chris Stiegler Turf Science Travel Award and Fellowship at the Turfgrass division. Bowling is working on his Master’s in Agronomy under Drs. Ben Wherley and Kevin McInnes. Chang is working on his Ph.D. in Soil Science under Drs. Wherley and Jacqui Aitkenhead-Peterson.

Niall Moore, who is working toward his Master’s in Plant Breeding under Dr. Bill Rooney, placed third in the Crop Breeding and Genetics poster competition.

Holly Lane, a Master’s student in Plant Breeding and Genetics division rapid oral/poster presentation competition.

Other awards:
Cynthia Sias, A Master’s student in Agronomy working under Dr. Bagavathiannan, was named the 2019 Texas Plant Protection Association (TPPA) Outstanding Graduate Student Award - Master’s level, at the recent conference. She also placed second in the poster competition at that conference.
Chengsong Hu, a Ph.D. student in Biological and Agricultural Engineering under the supervision of Dr. Bagavathiannan and Dr. Alex Thomasson, took first place in the TPPA poster competition.

Jorge Valenzuela Antelo, who is working on his Ph.D. in Plant Breeding under Dr. Amir Ibrahim, received a travel award from the Texas A&M University Office of Graduate and Professional Studies (OGAPS) to attend the WheatCap student training in San Diego, CA, in January 2020.

Hiba Ali joined us in the early morning hours November 20.

She is the first child of Jamshaid Junaid, and his wife, Khazina Amin.

Hiba weighed 8.7 pounds and was 21.75 inches long. “She is our princess,” her proud dad exclaimed. “We are blessed to have her and are trying our best to become good parents.”

Jamshaid, is a Ph.D. Plant Breeding student under the supervision of Dr. David Stelly.

Charleigh Anne Samuelson joined us November 21.

She is the third child of Spencer and Alyssa Samuelson. Her big sister Cali is three and big brother Hugh is 5.

Charleigh weighed 6 lbs. 13 oz. and was 20 inches long.

Her dad, Spencer, is working on his Ph.D. in Agronomy in Dr. Muthu Bagavathiannan’s weed science program.
Kochia, a kind of tumbleweed, has long been associated with the Texas High Plains, but its abundance is starting to alarm Texas A&M AgriLife officials. Regional producers are experiencing challenges controlling kochia as herbicide resistance is mounting.

Muthu Bagavathiannan, Ph.D., Texas A&M AgriLife Research weed scientist in the Texas A&M Department of Soil and Crop Sciences, College Station, said kochia has been a major multiple herbicide-resistant weed problem for some time in parts of the Great Plains – Kansas, Colorado, Montana and surrounding states, and even in Canada.

Spreading their seed
Kochia is a summer annual plant, germinating in the spring and maturing in the fall. It is often the first weed species to germinate in the soil each spring, Bagavathiannan said. Thousands of seeds are produced on one plant and spread into the soil when the weed breaks free and begins to tumble.

The tumbling ability is an important dispersal mechanism for this weed, which can rapidly spread herbicide-resistant genes across agricultural landscapes, he said. It is common to see kochia tumbleweeds get caught up in fence lines, and the dropped seed establishes a patch along the field edges and ditch banks. These patches are usually not well managed, leading to further spread into adjacent crop fields and pasture lands, Bagavathiannan said.

Falling behind
Jourdan Bell, Ph.D., Texas A&M AgriLife Extension Service agronomist, Amarillo, said where kochia is sprayed along a fence line, producers often use a non-selective burndown herbicide and overspray into the highway right of way. This can result in bare soil along the highway right of way and a perfect environment for weeds to proliferate. If the kochia patches are already resistant to glyphosate, it further magnifies the problem.

Resistance is a major concern, Bell said, because without effective management of kochia and other weeds, producers can see a big effect on their yields. In her research, she has seen up to an 80-bushel-per-acre difference between a corn plot with well-controlled weeds and an untreated control plot due to the resources being wasted by weeds.

Bell said she has received multiple calls from farmers in the area who faced kochia control failures with glyphosate, dicamba, metsulfuron and fluroxypyr and suspect multiple resistance to these herbicides.

“Though effective control has not been an issue so far in the area, we are beginning to monitor its spread and paying close attention to its response to herbicides,” said Peter Dotray, Ph.D., AgriLife Research weed scientist, Lubbock. “The key to effective kochia control is timeliness of preplant applications when weeds are very small.”

Surveying resistance
Bagavathiannan said he conducted a survey in the Texas High Plains in 2018 to start documenting the distribution of kochia and determine herbicide resistance status. He said he frequently observed kochia in winter wheat-fallow fields, especially in no-till systems, a pattern consistent with the Great Plains states. He also found corn, grain sorghum and cotton fields with severe infestations of this weed.

Bagavathiannan said resistance to glyphosate is suspected to be widespread in the samples since this chemical is frequently used for weed control in the fallow fields as well as in glyphosate-resistant corn and cotton.

Bell said a key to control is understanding there’s not just one chemical needed for a successful herbicide program.

“A successful program generally includes herbicides with residual activities in addition to post-emergence herbicides with several modes of action,” she said.

Gaining control
Dotray agreed heavy reliance on fewer herbicide modes of action for kochia control is fueling the issue – management must include diversified options. Pigweed resistance in the Texas High Plains followed a similar pattern.

Bell said she stresses to producers that most branches on the kochia plant have a growing point so when they only “burn back” the plant, they will still have seed production from lower branches in addition to contributing to herbicide resistance due to partial control.

“This is a serious problem,” Bagavathiannan said. “Farmers need to be proactive and aggressive in treating it using chemicals with multiple modes of action and incorporate other tools in their management programs. They also need to control the weed in field edges and roadsides, instead of letting it produce seed."

More research
Bagavathiannan said the increasing concern about kochia is prompting more research to fully understand the nature and distribution of resistance. He is collaborating on a regional-scale resistance evaluation study with Vipan Kumar, Ph.D., Kansas State University, Hays, Kansas; and Misha Manuchehri, Ph.D., Oklahoma State University, Stillwater.

Nithya Subramanian, Ph.D., AgriLife Research molecular weed scientist, College Station, will begin looking at mechanisms that might be contributing to resistance.
Women in Agriculture Science hold a mentoring pair-up

Female faculty and graduate students gathered at the Scotts facility recently for a mentorship pair-up sponsored by Women in Agriculture Science.

The event began with an overview of what it means to be a mentor and how to mentor successfully presented by Andrea Fonseca. Then each graduate student was paired with a faculty member who will serve as their mentor.

31st Annual Texas Plant Protection Association Conference held
**December**

13 - Graduation Ceremony, 2:00 p.m. Reed Arena
16-17 - Faculty Retreat - College Station
23-January 1, 2020 - Closed for the holidays

**January**

8-10 - AgriLife Conference, College Station, TX
8-10 - Beltwide Cotton Conferences, Austin, TX
9 - Soil and Crop Sciences State Faculty-Staff Meeting - 2:00, Heep 101
28-30 - National Agricultural Research, Extension, Education, and Economics Advisory Board Mtg

**February**

4-6 - Southwest Cotton Physiology Meeting, Ardmore, OK
6-7 - Soil Survey and Land Resource Workshop

**Save the Date**

March 2-4 - Biannual Plant Resistance to Insect Symposium at CIMMYT, Texcoco
March 2-5 - Turf Short Course
March 11-13 - Offices closed for Spring Break