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ATM | **SOIL & CROP SCIENCES**
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Happy New Year!

It is great to kick things off for the rest of the school year and to have many new students join us on campus. Classes resumed January 14, and the increased activity on campus is noticeable.

The winter meetings are in full swing. We had faculty and students participating in the Beltwide Cotton Conference, Soil Society of America annual meeting and the AgriLife Conference and others during the first week of January, and the Plant & Animal Genome (PAG) the next. The turfgrass group hosted a workshop this week, and later this month the Wheat Advisory group will meet in Amarillo, and Cotton Physiology will meet in San Angelo.

The new year has brought a change to our business office. We are excited to welcome Dana McMahan as our new business administrator. She replaces Jim Lukeman who retired in December.

We continue with more frequent rain in College Station than required. There is still cotton in the fields out at the research farm in the Brazos bottom, and a year of research data that will not be collected. State-wide many other crops were adversely affected as well.

Congratulations to all of our recent award recipients at the Vice-Chancellor, Director and Department levels (See stories and photos inside). It is great to see our exceptional faculty, staff, students and collaborators recognized. A special thanks to Ed Runge, Travis Miller and Taylor Barfield for leading our awards team on behalf of the department.

The Beltwide Cotton Conference recognized two of our faculty (Katie Lewis for junior career and Gaylon Morgan for career). Dr. David Stelly was recognized for his work in Cotton Biotechnology at the Plant and Animal Genome Conference. (see photos pages 8 and 4)

Congratulations to Kade Flynn and Sarah Hetrick, students in Cristine Morgan's lab, for awards at SSSA, and to Jeffery Siegfried, a Ph.D. student under Dr. Nithya Rajan, for his award at Beltwide (see photos of these award winners on page 8).

We had our annual meeting with the Deans and Directors and Vice-Chancellor last week. It was great to be able to provide our vision for the future including faculty positions, equipment needs and research, teaching and extension priorities. We were also able to cover some of our challenges and opportunities.

The government shutdown has started to impact some of our efforts. We can only hope that this is cleared up before it seriously impacts our activities.

Preparation is underway for planting in the Valley while the Panhandle braces for a bit more winter. We all hope for more favorable weather for the research crops this year.

We continue with interviews for a bio-photonics position to help us incorporate Raman spectroscopy into our research.

A special thanks to all of our commodity boards for their support in 2018 and ongoing support for 2019. We continue to be excited by the opportunities for collaboration and support of federal activities that can further help our scientists resolve issues facing Texas producers.

We lost two of our retired faculty this month. Our prayers go out to the families of Dr. Larry Wilding and Dr. Rupert Palmer.

Best wishes to all for a great 2019!

A handwritten signature in black ink that reads "David". The signature is written in a cursive, flowing style.

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/>

Vice Chancellor's Awards in Excellence presented to Soil and Crop Sciences faculty

The Vice Chancellor's Awards in Excellence were presented January 7th on the Texas A&M campus in College Station.

Since 1980, these awards have recognized the commitment and outstanding contributions made by faculty, staff, and students throughout Texas A&M AgriLife.

This year Dr. Larry Redmon, Associate Department Head for Extension; Dr. Steve Hague, Professor in cotton breeding; Dr. Muthu Bagavathiannan, Assistant Professor in weed science; and the Bennett Trust Women's Resource Stewardship Conference were among those honored.

Dr. Larry Redmon received the Vice Chancellor's Award in Excellence - Administration.



Dr. Larry Redmon (right) receives his Award in Excellence from Dr. Patrick Stover, Vice Chancellor and Dean of the College of Agriculture and Life Sciences. (Photo by Kellett Photography)

He has been the associate department head for soil and crop sciences and Texas A&M AgriLife Extension Service program leader since November, 2015. He supervises 28 Extension specialists and program specialists and three support staff personnel, while administering a state budget in excess of \$1.2 million.

"Dr. Redmon has provided a strategic road map in the shaping of the SCS department," said Dr. David Baltensperger, department head. "He has developed a vision for the department as a whole through retreats, industry/commodity contacts, and discussions with faculty and clientele."

"He is driven to integrate all functions of the department — teaching, research and extension — to make them complementary and synergistic. He also interacts routinely with all faculty regardless of their appointment."

Redmon leads the hiring process and has established a strong mentoring program to assure the success of new faculty. He has increased diversity within the department by increasing the number of both female and foreign-born faculty.

Read more about Dr. Redmon at: <http://soilcrop.tamu.edu/redmon-administration-award2019/>.

Dr. Steve Hague received the Vice Chancellor's Award in Excellence - Teaching.

According to his nomination, Hague always works diligently to improve his students' educational



Dr. Steve Hague (right) receives his Award in Excellence from Dr. Patrick Stover, Vice Chancellor and Dean of the College of Agriculture and Life Sciences. (Photo by Kellett Photography)

experiences. Over the last decade, he has consistently demonstrated a commitment to teaching, and has remained an asset for his students after graduation. He also assists other faculty in developing their teaching programs.

"Dr. Hague's classroom teaching is innovative and interactive," said Dr. David Baltensperger, head of the Texas A&M soil and crop sciences department. "He demonstrates a versatile teaching style with conventional courses, distance-delivered courses, study abroad programs, honors sections, writing-intensive courses and field trip-based courses."

Both graduate and undergraduate students have the opportunity to obtain valuable research experience in Hague's cotton breeding program.

He currently chairs six graduate students and has served on the committees of more than 20 students outside his research program.

Read more about Dr. Hague at: <http://soilcrop.tamu.edu/hague-tamvcteaching-award-2019/>

Dr. Muthu Bagavathiannan received the Vice Chancellors Award in Excellence - Early Career Research.

Bagavathiannan is a tenure-track assistant professor of weed science with an AgriLife Research Appointment.

He joined the department in 2014 and established a research group which has gained national and international attention.

"Muthu's research focuses primarily on understanding herbicide-resistance evolution in weeds



Dr. Muthu Bagavathiannan received the Vice Chancellor's Award in Excellence - Early Career Research for 2018.

and developing integrated weed management solutions for various cropping systems," said Baltensperger.

As a principal or co-investigator he has received more than \$15 million in grant funding from a variety of sources. \$3.3 million went directly to his research.

Muthu supervises four doctoral students, two master's students and is serving on the committee for one student. He has mentored 11 international scholars/interns and 10 undergraduate student researchers, and mentors two postdoctoral students and two research assistants.

Read more about Dr. Muthu at: <http://soilcrop.tamu.edu/bagavathiannan-earlycareer-award/>

The Vice Chancellor's Award in Excellence - Climate and Diversity was presented to the **Bennett Trust Women's Land Stewardship**

Conference, a team effort led by Dr. Larry Redmon.

The team includes Redmon, Dr. Robert Lyons, range specialist, Uvalde; Dr. Megan Clayton, range specialist, Corpus Christi; Roy Walston, agriculture and natural resources county agent, Kerr County; Brad Roeder, agriculture and natural resources county agent, Gillespie County; and Todd Swift, regional program leader, South Region.

Established in 2015, the Bennett Trust Women's Conference was designed to provide women with basic information regarding management practices for natural resources in the Edwards Plateau and to empower them to make decisions in the management of their land and its natural resources.

It is two-day conference held in Fredericksburg each October, consisting of one day in the classroom and one day visiting women-owned agricultural enterprises in the region.

The attendees range in age from 20 to 80, and most own land, but have not previously been responsible for the management or involved in the management decision.

"Our goal with the women's conference is to provide them with the tools and confidence to return to their ranch and make a difference," Redmon said. "This is a critical part of the overall goal of the program."

Read more about the Bennett Trust Women's Land Stewardship program at: <http://soilcrop.tamu.edu/bennett-womens-vcaward/>.



The Bennett Trust Women's Land Stewardship Conference Team received the Award in Excellence - Culture and Diversity. From Left to right are Dr. Patrick Stover, Vice Chancellor, Dr. Larry Redmon, Dr. Bob Lyons, Brad Roeder, Roy Walston, and Todd Swift. Not pictured, Dr. Megan Clayton.

Stelly receives cotton biotechnology award at Plant and Animal Genome Conference

Dr. David Stelly was unanimously selected to receive the Cotton Biotechnology Award at the Plant and Animal Genome Conference in San Diego.

Stelly has more than 40 years of cotton breeding experience and is world renowned for his work in cytogenetics, chromosome substitution lines and the 63K SNP chip genotyping tool.

The award is administered by the Ag and Environmental Research Dept. of Cotton Incorporated. It recognizes outstanding biotechnology research in cotton and has only been awarded on six occasions since its inception in 2000.

Read more about Dr. Stelly at: <http://soilcrop.tamu.edu/stelly-cotton-award-pag/>.



Dr. David Stelly receives the 2018 Cotton Biotechnology award from Dr. Don Jones of Cotton Incorporated. (Texas A&M AgriLife photo)

AgriLife Extension recognizes superior service

By: Beth Ann Luedeker

The Texas A&M AgriLife Extension Service presented its Superior Service Awards, the agency's highest honors, during a ceremony at the AgriLife Center January 8. Several members of the Department of Soil and Crop Sciences were among those honored.

Ranch Management University earned a team award and Ward Ling received the Superior Service - Extension Program Specialist award.



Dr. Bob Whitson, Interim Associate Director for State Operations (left) and Dr. Parr Rosson, Interim Director AgriLife Extension (right), presented the awards to team members (back row) Matt Brown, Dr. Larry Redmon, Dr. Jason Cleere, (front row) Linda Francis and Dr. Jim Cathey. Not pictured is team member Dr. David Anderson.

The Ranch Management University (RMU) team is led by Dr. Larry Redmon, Associate Department Head for Extension in Soil and Crop Sciences. Team members include Dr. David Anderson, economist-livestock marketing; Dr. Jason Cleere, beef cattle specialist; Linda Francis, Soil and Crop Sciences administrative coordinator; Matt Brown, Soil and Crop Sciences program specialist; and Dr. Jim Cathey, Texas A&M Natural Resources Institute associate director.

RMU was established in 2010 to address a growing population of absentee landowners who have grown up in urban environments and lack formal training in the management of natural resources. It is held twice each year, in April and October.

According to the nomination, the five-day course provides basic information regarding economically and environmentally sound management of soil, plant, animal and water resources, and introduces participants to the educational resources available to them through AgriLife Extension.

The workshop combines classroom instruction with field demonstrations in a range of subjects including sprayer calibration, hay sampling, aquatic weed identification and management, soil sampling, beef cattle management, and feral hog control.

To date, attendees have come to College Station from all

over Texas and from California, Florida, Illinois, Louisiana, Oklahoma and Costa Rica for the workshop.

Program Specialist Ward Ling is the coordinator of both the Geronimo/Alligator Creeks watershed and the Mill Creek watershed.

He joined the Department of Soil and Crop Sciences in 2009 to oversee the development and implementation of a watershed protection plan for the Geronimo and Alligator Creeks watershed, adding the Mill Creek watershed in 2018.

Ling's primary duty is to educate stakeholders in the watersheds in best management practices for their activities and to encourage the voluntary adoption of these practices. He also performs due diligence for projects planned along the creeks to ensure that the creeks are not damaged.

"Before coming to AgriLife Extension, I worked in a regulatory program of the Texas Commission on Environmental Quality (TCEQ). This job appealed to me because of its voluntary nature," Ling stated.

Protection of a watershed is a long term commitment by stakeholders within that watershed. It took three years for Ling and the stakeholders to develop the watershed protection plan (WPP) and get it approved by the TCEQ. Now he is implementing programs to educate stakeholders, both agricultural landowners and urban residents.

"My job is to increase awareness and to educate people so they want to adopt these practices," he said. "They are not building any more creeks and rivers so we need to protect what we have."

Ling's programs include septic system maintenance, water well management and creek clean-ups.

"We started doing annual watershed clean-up along the Alligator and Geronimo creeks in 2013 and usually have

between 150 - 200 people participate," he said. "In the six years of the project we have had 1,120 volunteers and taken 16,000 pounds of trash out of the watershed."



Ward Ling, center, received the Superior Service - Extension Program Specialist award from Dr. Bob Whitson and Dr. Parr Rosson.

Texas A&M AgriLife Research recognizes two Faculty Fellows

By: Kay Ledbetter

Texas A&M AgriLife Research recognized two faculty members from the Texas A&M University soil and crop sciences department — as a Faculty Fellow and Senior Faculty Fellow — on Jan. 8.

Dr. Cristine Morgan, a soil physicist, was honored with the Faculty Fellow title for impactful research recognized by her colleagues in the U.S. and globally. Her research has affected change both within and outside of her discipline, according to her nomination.

Dr. Bill Rooney, a plant breeding and genetics professor, was recognized with a Senior Faculty Fellow Award — he received the Faculty Fellow in 2011 — for his extensive research and direction of the AgriLife Research Sorghum Improvement Program at College Station, his nomination stated.



Morgan has led a major shift in moving her discipline from laboratory studies to addressing critical challenges using technically innovative, field-based methods, said Dr. David Baltensperger, head of the department of soil and crop sciences.

“Dr. Morgan’s standing in the Soil Science Society of America as an elected member of the board of directors and the co-coordinator of the first International Soils Contest for the International Union of Soil Science indicates she is viewed by her peers as a leader in soil science,” Baltensperger said.

“As a researcher, her reputation of performing quality, cutting-edge research and incorporation of practical and creative solutions is demonstrated by her success in grantsmanship,” he said.

Morgan’s impact reaches beyond academia through mentoring of students and leadership among non-academic stakeholders as evidenced by her work with the Soil Health Institute, recognition by the White House and international leadership involving economists, sociologists and capital markets to achieve global soil security, the nomination stated.

Her most cited accomplishment has been the development of diffuse reflectance spectroscopy, VisNIR, technology and methodology to quantify soil constituents in situ, the nomination continued. She transformed VisNIR technology from a newly explored laboratory instrument to a robust and reliable field method that maps soil profiles without pulling physical soil samples.

This technology enables collection of fine-spatial resolution soil data for application in digital agriculture including environmentally specific plant responses and soil chemical and physical processes. She has filed a patent application, and in partnership with The Climate Corp., continues to make her inventions commercially applicable.

Morgan has organized three international Soil Security Symposia, and has been invited to be a member of the coordinating coalition for soil health led by the Soil Health Institute.

Rooney was named a Texas A&M Regents Professor in 2015, and in 2018 was designated as the Borlaug-Monsanto Chair in International Crop Improvement.

His research pertains to the genetics of important traits in sorghum and sorghum germplasm, germplasm development and application in U.S. and world sorghum production systems. He also trains graduate students in plant breeding and genetics using the sorghum breeding program as a model program.

Rooney’s program originally focused on grain sorghum but expanded and pioneered research in the use of sorghum as a bioenergy crop and specialty grain crop, Baltensperger said.

Utilizing a base of sorghum germplasm, Rooney, his research group and a wide group of collaborators conducted research into the genetics of biomass sorghum yield, composition and stress tolerance, and developed parental lines of sorghums used to create the first bioenergy sorghum hybrids, Baltensperger said.

In the specialty crop area, his program produced and licensed the first black sorghums, prized for their high antioxidant profile and health benefits. These products are now used in GrainBerry Cereals, which are marketed nationwide.

In addition to sorghum-specific research, Rooney has been involved in the development of a wide hybridization sorghum program designed to enhance and improve sorghum and other potential bioenergy species through hybrids.

The program developed unique genotypes of sorghum capable of hybridization with sugarcane. This allows production of sorghum/sugarcane hybrids, which provide researchers valuable opportunities to transfer important traits between the two crops or even possibly the development of a new bioenergy hybrid combining useful traits from both parents in a seed-propagated crop. While this work remains years from application, the wide hybridization work represents a new and novel discovery with potentially wide-ranging applications.



Dr. Bill Rooney (Texas A&M AgriLife photo)

Congratulations to our Departmental Awards Recipients!



Graduate Student Research Award - Agronomy
Diana Zapata



Graduate Student Teaching Award
Heather Baldi



Extension Collaboration Award
Drew Gholson



Research Support Award - Lab
Javid McLawrence



Research Support Award - Field
Reagan Hejl



Technical Staff Support - Lab
David Rooney



Technical Staff Support Award - Field
Donald Jakubik



Special Service / Recognition Award
ASCO Equipent - Randy Klussman (center)
Williamson Co. Equipment - Rich Thornton

Departmental Award Winners Continued

Due to society meetings, conferences and other duties, many of our award winners were not able to be present at the ceremony. Award recipients not pictured include:

Administrative Support Award
Kathleen Peacock

Graduate Student Research Award - Soil Science
Dianna Bagnall

B.B.Singh Award - Outstanding Research in Crop Sciences
Keerti Rathore

Post-doctoral Research Award
Debalin Sarangi

Collaborating County Extension Agent Award
Rick Auckerman

Research Faculty Award
Girisha Ganjgunte

Extension Faculty Award
Jourdan Bell

Teaching Award
Haly Neely

Graduate Student Research Award - Plant Breeding
Ace Pugh

Undergraduate Student Support Award
Nicole Shigley



Gaylon Morgan and Katie Lewis

Drs. Gaylon Morgan, left, and Katie Lewis were recognized for their achievements in cotton research and extension at the 2019 Beltwide Cotton Conference in New Orleans.

Morgan received the Outstanding Research Award for Cotton Agronomy in recognition of his significant research contributions in that area.

Lewis received the Dr. J. Tom Cothren Outstanding Young Cotton Soil Scientist award in recognition of her significant research contributions in soil science.

Kade Flynn and Sarah Hetrick placed first and second, respectively, in the

Soil and Crop Science faculty and students recognized at society meetings

Soil Physics and Hydrology division student rapid oral presentation competition at the Soil Science Society of America annual meeting in San Diego earlier this month.

Both Flynn and Hetrick are students in Dr. Cristine Morgan's hydrogeology program.

There were 18 students in the competition, which included posters and oral presentations.

Flynn is a sophomore geology major



Kade Flynn, 2nd from right, and Sarah Hetrick, 3rd from right, topped the field in their rapid oral presentation competition at the Soil Science Society of America annual meeting in San Diego.

and Hetrick is a Master's student under Dr. Morgan.



Jeffery Siegfried, right, receives his award at the Beltwide cotton conference.

Jeffrey Siegfried, right, placed first in the graduate student research presentation competition at the 2019 Cotton Agronomy, Physiology and Soil Conference of the Beltwide Cotton Meetings.

His presentation was titled "Proximal and Unmanned Aerial Remote Sensing for Monitoring Crop Growth and Stress".

Jeff is a Ph.D. student in Agronomy under Dr. Nithya Rajan.

Xu recognized as AgriLife Research Director's Research Scientist of the Year

By: Kay Ledbetter



Dr. Wenwei Xu received the inaugural AgriLife Research Scientist of the Year award from Dr. Patrick Stover, acting director of AgriLife Research

Dr. Wenwei Xu received the Texas A&M AgriLife Research Director's Research Scientist of the Year award for at a ceremony on campus January 8.

Xu's work has helped reduce aflatoxin contamination in corn and improve corn production under drought-prone conditions, according to his nomination.

Using tropical germplasm and wild species, Xu developed inbred lines and germplasm with improved

drought and heat tolerance, insect resistance and mycotoxin resistance.

He has released nine maize inbred lines to the public and licensed several others to seed companies. In 2018 his high yielding, disease resistant silage corn hybrid began commercial production in Turkey.

Read more about Dr. Xu at: <http://soilcrop.tamu.edu/xu-aglresearch-scientist-oty2018/>



Former Student News

Brijesh Angira '16, who earned his Ph.D. in Plant Breeding in 2016, has accepted a position as Assistant Professor - Research in rice breeding and genetics at the Louisiana State University AgCenter. He had previously been a Research Associate Specialist there.

Brijesh also has had a title change at home. He is now "Dad". Brijesh and his wife, Monika, welcomed their first child, Ryan Angira, on November 8, 2018.

Congratulations, Brijesh!



Congratulations!



Dr. Reagan Noland and his wife, Stephanie, have a new baby boy!

Milo Lee Noland was born January 4, weighing 10 lbs. 8 oz., and measuring 22 inches long. Both mom and baby are doing great.

Reagan is the Texas A&M Extension Agronomist in San Angelo.

Congratulations to Dr. Becky Grubb and Will Bowling, who were married January 19th. Becky is the Extension Turfgrass Specialist in College Station, and Will is working on his Master of Science in Agronomy focused on turfgrasses.



New caveats for Texas auxin herbicide training

By: Kay Ledbetter

Producers will need to pick up a second round of auxin training this year if they plan to use dicamba products, according to a Texas A&M AgriLife Extension Service specialist.

In late October, the U.S. Environmental Protection Agency announced it will extend the registration of dicamba for two years for over-the-top weed control in dicamba-tolerant cotton and soybean.

The extended labels include changes to ensure these products continue to be used effectively and to address concerns about off-target movement, said Scott Nolte, Texas A&M AgriLife Extension Service state weed specialist, College Station.

Initial label changes state only certified applicators may apply dicamba over the top of the crop, Nolte said. The changes also prohibit over-the-top applications 60 days after planting for cotton and 45 days for soybeans.

The new rules limit the number of over-the-top applications to two for both cotton and soybeans, and limit applications between one hour after sunrise and two hours before sunset. In counties where endangered species exist, applicators must maintain the downwind

110-foot buffer and add a 57-foot buffer around the other sides of the target field.

Nolte warned some of these new changes may be different before the 2019 spring growing season pending 24C, additional-use, requests submitted to the Texas Department of Agriculture. If approved, the 24C labels will be available on the TDA website, www.texasagriculture.gov/RegulatoryPrograms/Pesticides.

Three dicamba products – Engenia herbicide by BASF Corporation, XtendiMax herbicide with VaporGrip Technology by Bayer CropScience, and DuPont FeXapan herbicide Plus VaporGrip Technology by Corteva Agriscience – are restricted-use pesticides and state-limited-use pesticides in Texas, which requires the sale to and use by certified applicators only.

Nolte clarified that the auxin trainings are not a substitute for the state-specified certified applicator training, which is required to purchase and use restricted-use pesticides.

Also, TDA has added 2,4-D choline formulations – Enlist Duo and Enlist One for use on 2,4-D-tolerant crops – to be included in these mandatory trainings. These are state-limited-

use pesticides in Texas and can only be sold to and used by certified applicators or those working under the supervision of a certified applicator.

The two-hour mandated auxin trainings for the new year will include the following topics: why do auxin herbicides require additional precautions, label requirements for approved auxin formulations, understanding temperature inversions, spray system hygiene, record keeping and using dicamba or 2,4-D in a weed management system.

AgriLife Extension will be providing a two-hour in-person course, approved by TDA, that will fulfill the training requirements for dicamba and 2,4-D choline products and will include two continuing education units for laws and regulations.

Contact the local AgriLife Extension county agent for training locations, dates and times.

Nolte said BASF Corporation, Bayer CropScience and Corteva Agriscience also will be requesting TDA-approved training courses focusing on each company's specific technology and will therefore only be one-hour, one CEU courses.

Sympathy

*Please keep these members of our Soil & Crop Sciences family
in your thoughts and prayers.*

The family of Dr. Larry Wilding who passed away January 12. Dr. Wilding was a Soil and Crop Sciences Professor Emeritus. He had been a soil scientist in the department for more than 26 years. The family requests any gifts be made as donations to the Larry and Gladys Wilding International Student Travel Scholarship.

Michael Baring and his family as they mourn the loss of his father, Marvin Baring, who passed away January 12 due to complications from an infection. Michael is an Assistant Research Scientist in peanut breeding based in College Station.

Al Nelson and his family as they mourn the loss of his brother, Gene "Eric" Nelson. Al is the manager of the research farm outside College Station.

The family of Dr. Rupert Palmer who passed away January 14. Dr. Palmer was the Extension Weed Specialist in the Department of Soil and Crop Sciences from 1966 - 1989.

Concerns

Please keep these members of our Soil & Crop Sciences family
in your thoughts and prayers.

Pat Runge, wife of Dr. Ed Runge, as she recovers from shoulder replacement surgery.

Olivia Carson, daughter of Dr. Kathy Carson, who continues to battle bone cancer.

AgriLife Research wheat breeder talks value, marketing during Latin American tour

By: Kay Ledbetter

For Dr. Jackie Rudd, Texas A&M AgriLife Research wheat breeder in Amarillo, his job isn't just about experimenting with and growing new varieties of wheat.

Equally important, Rudd said, is finding markets that recognize the value of breeding research and meeting with future end-users to determine what qualities they need in the wheat.

"Not only do our varieties need to remain productive, they have to be marketable at a premium price," he said.

He said the demand for whole-wheat products is growing domestically and globally with the increasing consumer consciousness of the effect of diet on their health.

"We need a strong protein to make bread, and even stronger protein quality for whole wheat products," Rudd said. "So, our quality must carry through from the kernel to the flour to the dough."

Working with U.S. Wheat Associates, the export market development organization for the U.S. wheat industry, Rudd recently traveled with the Wheat Quality Improvement Team through Latin America with stops in Mexico, Guatemala, Costa Rica and Peru.

"Our purpose on this type of trip is to meet with end-users and allow them to educate us as breeders about the specific end-use quality requirements of key overseas markets, since about half of all U.S. wheat is exported," Rudd said.

During the visit, flour millers and commercial bakers talked with the team about operation efficiency and how that is affected by wheat quality. They

discussed shipment consistency, wheat cleanliness and dough strength.

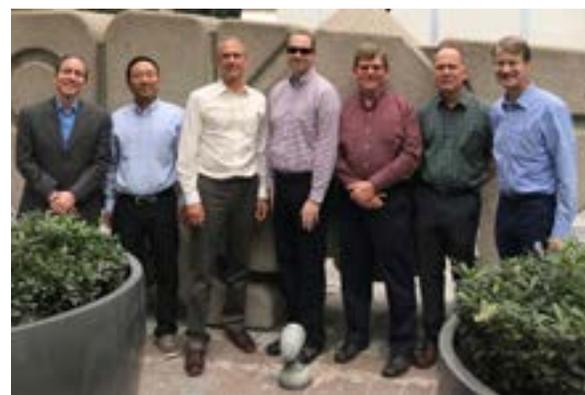
The quality and quantity of protein affects dough strength, Rudd said. So, for instance, cookies can utilize a lower protein wheat, where crackers need mid-levels of protein and bread needs a high-protein wheat.

"Our core message is that wheat quality is not an accident," he said. "Quality is a product of long-term investments by growers and years of scientific breeding work."

The trip, with a team of three other wheat breeders and a cereal chemist from various U.S. universities, was paid for by the Texas Wheat Producers Board and other state producer groups. These organizations provide support and funding for wheat research, education and market development.

"Latin America is a primary and growing market for U.S. wheat," said Rodney Mosier, Texas Wheat Producers executive vice president, Amarillo. "Trips like this are designed to help us meet the needs of our customers to build demand. In the end, the ultimate goal is to boost prices for Texas farmers."

"We were really excited to send Dr. Rudd to meet directly with some of our top customers," Mosier said. "We have some of the best quality wheat produced right here in Texas and continuing to build on our successful breeding programs will help us maintain and grow this critical market."



Pictured left to right, Marcelo Mitre Dieste, U.S. Wheat Associates; Dr. Guorong Zhang, Kansas State wheat breeder; Dr. Brett Carver, Oklahoma State wheat geneticist; Dr. Arron Carter, Washington State wheat breeder; Dr. Jackie Rudd, Texas A&M AgriLife Research wheat breeder; Dr. Mike Giroux, Montana State durum wheat breeder; and Steve Wirsching, U.S. Wheat Associates. (Texas A&M AgriLife photo)

Because most Texas wheat is hard winter wheat and bread is the primary market, Rudd said his mission was to interact with end-users interested in higher-protein wheat. Similarly, Washington's breeder of soft wheat was in more discussions with cookie manufacturers.

"It is important for us as breeders to know what our wheat customers want," Rudd said. "It helps reinforce our quality targets. While many potential buyers generally like our wheat, we need to be listening to them about what is working and what needs more attention."

The trip also included sampling different kinds of bread, pastry and cookie products, he said, because, "taste is the ultimate quality check for most consumers."

Manipulation of gossypol-containing glands in cotton can boost plant's natural defenses

By: Kay Ledbetter

Development of a cotton plant with stronger natural defenses due to a greater gland density and thus more gossypol in the leaves could soon be a reality, according to a Texas A&M AgriLife Research plant biotechnologist in College Station.

Seeds and other parts of cotton possess dark glands containing toxic terpenoids such as gossypol that defend the plant against pests and pathogens, said Dr. Keerti Rathore, AgriLife Research plant biotechnologist in the Institute for Plant Genomics and Biotechnology at Texas A&M University.

Rathore and his team compared RNA production in the embryos from a glanded cotton and a mutant glandless plant. These analyses resulted in the identification of three genes that play a critical role in gland formation, he said.

The study, "Genes regulating gland development in the cotton plant," has been published online in the *Plant Biotechnology Journal*, <https://doi.org/10.1111/pbi.13044>. The research was supported by funds from Cotton Inc. and Texas A&M AgriLife Research.

The team used virus-induced gene silencing and CRISPR-mediated gene knockout to reduce/eliminate the glands in the plant, thus validating the function of the genes.

Rathore's lab recently announced development and deregulation of a gossypol-free cottonseed – ultra-low gossypol cottonseed or ULGCS – that could be a new source of protein for the more efficient aquaculture species and poultry or even as human food.

However, equally important in the world of scientific discoveries, he said,

is the intriguing possibility of enhancing the expression of these genes to increase the number of glands in the leaves and floral tissues. This would allow for boosting gossypol production in those locations and strengthening the plant's natural defenses.

"There is an increasing need for such a natural defense mechanism against pests because more and more insect species are developing resistance to various forms of Bt-cotton," Rathore said.

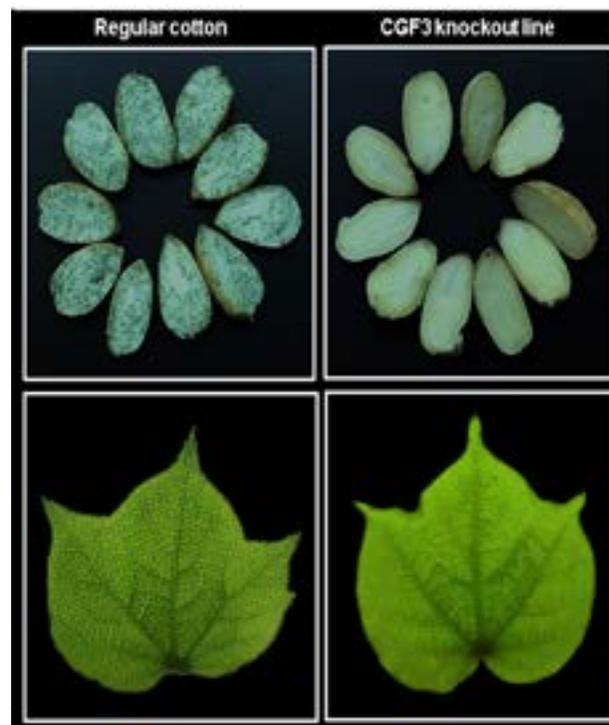
He said the results of this continued study "is a very important scientific discovery, and it also has some historical significance."

Rathore explained that in the 1950s, a cotton breeder discovered a mutant cotton plant that was free of glands being grown by the native Americans of the Hopi tribe in Arizona. These cotton plants were the original source of glandless and, therefore, gossypol-free cottonseeds.

"A lot of human nutrition and animal feeding trials were conducted using these, including some at Texas A&M," he said. "However, these plants did not fare very well in the field because they lacked the protection provided by gossypol."

He explained this is when his ultra-low gossypol cottonseed work proved helpful.

"We had selectively eliminated gossypol from the seed only," Rathore said. "Now, in this recent paper, we show exactly the genes that



Left top and bottom, normal cotton exhibits gossypol-containing glands (dark-colored dots) in the seed and leaf. Right top and bottom, seed and leaf show the effect of laboratory-created disruption of Cotton Gland Formation gene 3, CGF3, confirming its role in gland development, (Texas A&M AgriLife photo by Dr. Devendra Pandeya)

are defective and the nature of the mutations in this Hopi cotton for the first time. Even though breeders have known about the Hopi cotton for the past 64 years, no one knew the exact nature of mutations that made the plant free of glands."

The sequence of the genes now provides Rathore and other researchers with tools that can be used to selectively eliminate gossypol from the seed as well as increase the number of glands, and therefore gossypol levels, in the leaves and floral parts to help the cotton plant better defend itself against pests.

"To provide an analogy, our ULGCS trait is akin to iPhone 4, whereas this discovery represents technology that can be used to create iPhone 10," he said.

Experts: Get private well water screened after flooding to ensure safety

By: Paul Schattenberg

Results from Texas well water screenings in areas affected by flooding over the past few years show the importance of those screenings in helping ensure water quality and human health, said Texas A&M AgriLife Extension Service personnel supporting the agency's Texas Well Owner Network, or TWON.

"Private water well owners whose wells have been flooded should assume their well water is contaminated until tested," said Dr. Diane Boellstorff, AgriLife Extension water resource specialist in the department of soil and crop sciences, College Station. "You should not use water from a flooded well for drinking, cooking, making ice, brushing your teeth or even bathing until you are satisfied it is not contaminated."



After flooding, those with private water wells should assume their water quality has been compromised and have water samples screened for E. coli and other possible contaminants. (Texas A&M AgriLife Extension Service photo)

Floodwater may contain substances from upstream, such as manure, sewage from flooded septic systems or other contaminants. Furthermore, there is no regulation or oversight for private wells, so well owners are independently responsible for monitoring their water quality, she said.

"A septic system near a well also can cause contamination when the well is flooded," Boellstorff noted. "Well

owners need to be concerned with E. coli because its presence indicates well water has been in contact with fecal waste from humans or other warm-blooded animals."

John Smith, AgriLife Extension program specialist, College Station, said water contaminated with E. coli is more likely to have pathogens present that can cause diarrhea, cramps, nausea or other symptoms in humans.

"Water wells should be tested annually with water samples screened for common contaminants, including E. coli, coliform bacteria, nitrate-nitrogen and salinity," he said.

Since its inception, TWON has screened water samples from more than 10,000 wells throughout the state.

"As part of our outreach, each year the network offers many well water screenings and educational programs for private well owners throughout Texas," said Dr. Drew Gholson, AgriLife Extension program specialist and Texas Well Owner Network coordinator, College Station. "These are typically done in collaboration with the local AgriLife Extension office and, in some instances, emergency management personnel. With the amount and extent of flooding we've seen in the state over the past few years, we felt it was important and necessary to offer additional screenings in affected areas."

For example, Gholson said, after Hurricane Harvey, there were additional screenings in 24 counties that had experienced flooding. More than 1,500 private water wells within the affected area were screened.

"We typically find 3-5 percent of well samples tested in our regular screenings are positive for E. coli," he said. "But about 20 percent of the samples collected and screened from counties affected by

flooding from Hurricane Harvey had E. coli. This means the likelihood of E. coli contamination in private water wells affected by flooding can be anywhere from four to seven times greater than under normal conditions."

Gholson said such results, as well as those from recent screenings in the Texas Hill Country after that region experienced severe flooding, demonstrate the importance of having well water tested post-flooding.

"From the 18 well water samples from Burnet County we screened, one showed E. coli contamination," he said. "Of the 77 samples from Llano County, 11 had E. coli contamination, and three of the 30 samples from Mason County were positive for E. coli. In San Saba County, five of 13 samples, or 38.5 percent, showed E. coli contamination. All together, these four counties had 138 well water samples screened, with 20 of them, or 14.5 percent, having E. coli."

Boellstorff said if a private well owner believes a well might be contaminated by floodwater, only bottled, boiled or treated water should be consumed until the well water has been tested and found safe. She noted information on decontaminating a well can be found in the AgriLife Extension publications "Decontaminating Flooded Water Wells" and "Shock Chlorination of Wells" on the TWON website."

"After a flood, well owners should also inspect the well for physical damage and look for signs of leakage," Gholson added. "If it appears damaged, consult a licensed water well contractor to determine whether repairs are needed. And well owners should also have the well pump and electrical systems checked out."

For more information on TWON, go to <http://twon.tamu.edu>.

New computer model uses decades of data to help producers predict wheat forage success

By: Adam Russell

A new, pioneering forage wheat model could provide a valuable technique to researchers exploring the potential of biomass production for cool-season annual forage grasses, according to model developers.

Researchers at the Texas A&M AgriLife Research and Extension Center in Overton – Dr. Monte Rouquette, Texas A&M AgriLife Research plant physiologist, and Dr. Prem Woli, AgriLife Research crop modeler, recently published a paper in *Agronomy Journal* titled “Simulating Winter Wheat Forage Production in the Southern U.S. Using a Forage Wheat Model.”

It focuses on annual forage grass modeling with the Decision Support System for Agrotechnology Transfer, or DSSAT, suite of crop computer models. Research by Dr. Charles Long, AgriLife Research animal breeder and center director; Dr. Ray Smith, AgriLife Research plant breeder and Dr. Lloyd Nelson, AgriLife Research plant breeder and professor emeritus, all in Overton, also contributed to the publication.

“This model using DSSAT provides an application of decades of field data from Texas A&M AgriLife Research at Overton to be used to guide future decisions on forage wheat production,” Long said. “Simulating alternative outcomes for forage wheat production management options will ultimately aid producers in making decisions.”

DSSAT is a software application program that comprises dynamic crop growth simulation models for over 40 crops, according to the DSSAT website. The program is supported by a range of utilities and applications for weather, soil, genetics, crop management and observational experimental data. It also includes example data sets for all the crop models included in the suite.

Crop simulation models, including the forage wheat model, simulate growth, development and biomass production as a function of the soil-plant-atmosphere

dynamics and management.

The soil-plant-atmosphere system comprises environmental factors such as soil type, weather – temperatures, solar radiation, wind and precipitation – and production management variables including cultivars, planting/harvesting dates and inputs such as nitrogen fertilizer, Rouquette said.

Like other crop models, the forage wheat model may be used by researchers, educators or students to understand the mechanisms underlying forage wheat biomass production — or by growers or extension agents as a tool for optimizing forage wheat production, Woli said. Users can analyze “what-if” scenarios by manipulating the various factors that impact biomass production.

Rouquette said around 30 growing seasons of winter wheat forage trial results data and 74 years of weather data from Overton and Henderson were used to calibrate and evaluate the DSSAT forage wheat model.

“We have a lot of history of small grain plantings for forage from Dr. Nelson’s variety trials here in Overton,” Rouquette said. “The field data ensure simulations are accurate and verifiable based on realistic conditions producers face season to season.”

The forage wheat model was used by the researchers to study winter wheat biomass responses to nitrogen, as influenced by two soil types. One was Lilbert, a sandy loam soil with more organic matter and water-holding capacity. Another was Darco, a sandy soil with low organic matter and water-holding capacity. Three planting dates were set between September and December and the ENSO – El Niño, La Niña and neutral – weather patterns, Woli said.

“By changing production factors, a model can simulate thousands of scenarios in minutes or hours compared to decades of field trials,” he said. “This is significant for forage production because it tells us



A new DSSAT crop model created by Texas A&M AgriLife researchers will allow researchers around the world simulate biomass production to help producers make science-based decisions regarding winter wheat forage growth. (Texas A&M AgriLife photo by Dr. Jourdan Bell)

what the variabilities mean in the form of biomass for livestock. It’s significant to researchers because until now we have only had the option of knowing what the outcome was under natural climate conditions each growing season.”

Of the various factors studied, Rouquette said nitrogen played the most important role in biomass production.

“If you’re not fertilizing in the Southern U.S., you’re not growing,” he said. “The ENSO was not a significant factor for winter wheat forage production in this region because wheat is drought tolerant and a cool-season forage that isn’t very susceptible to drought.”

For instance, the simulation results showed winter wheat biomass was optimized at 120 pounds of nitrogen fertilizer per acre on the Lilbert soil, whereas the Darco soil required 240 pounds of nitrogen per acre, Rouquette said.

Rouquette said the research was focused on modeling winter wheat forage production for various scenarios without consideration of whether management calibrations, such as nitrogen and irrigation, were cost-effective or prohibitive. However, he noted, forage modeling with market conditions and input cost calibrations also considered could be possible in the future to help guide producer decision-making from season to season.

Tomorrow's scientists help with today's discoveries

By: Kay Ledbetter

Today's research advances in the world of wheat genetics are getting a big hand from tomorrow's scientists, according to a Texas A&M AgriLife Research scientist who has had three students publish their research in major journals this past year.

These Texas A&M University students working through their doctoral studies have helped conduct major studies that improved the understanding of unique traits in TAM wheat cultivars released by AgriLife Research's wheat breeding program, said Dr. Shuyu Liu, AgriLife Research wheat geneticist in Amarillo and committee chair of the three students.



Dr. Shuyu Liu leads the wheat genetics lab at the Texas A&M AgriLife Research and Extension Center in Amarillo. (Texas A&M AgriLife photo by Kay Ledbetter)

"When Texas A&M develops a wheat variety that has outstanding performance, it is critical we are able to determine what makes them superior and locate the genes responsible," said Dr. Jackie Rudd, AgriLife Research wheat breeder in Amarillo. "Knowing what genes are located where allows us to build new cultivars that combine these characteristics.

"We are able to guide the student research to be an integral part of the wheat breeding process so that the results will directly contribute to future variety development," Rudd said.

Their studies not only help the researcher's current projects, but the students are getting valuable training for their next steps in research once they graduate, Liu said. They learn to fully manage a project – planning, designing, working together with a team, summarizing data, statistical analysis and writing skills.

Additionally, each student can bring a new perspective to the research, and with that, the collaborating scientists can learn from the students, he said.

In the past year, Liu's lab and student researchers have received major exposure in three key crop science journals. All three students' journal papers dealt with TAM 112 and TAM 111, two popular cultivars in Texas and the rest of the hard-red winter wheat regions, Liu said.

While working with Liu's program, Silvano Ocheya Assanga had his work "Mapping of quantitative trait loci for grain yield and its components in a U.S. popular winter wheat TAM 111 using 90K SNPs" published in PLoS One.

This study used wheat progenies derived from a TAM 111 cross to identify major groups of genes that impact yield. The major components of yield are kernel weight, kernels per head and head per square meter.

That article can be found at <https://tinyurl.com/PLoSOneTAM111>.

Smit Dhakal had his study "Mapping and KASP marker development for wheat curl mite resistance in TAM 112 wheat using linkage and association analysis" published in Molecular Breeding. This study was about mapping wheat curl mite resistance and the development of high throughput single nucleotide polymorphisms, or SNPs, for marker-assisted breeding of this gene.

The journal article can be found at :

<https://tinyurl.com/MolBreedingTAM112>.

"The source of this resistance gene is from goatgrass, which contributed the D genome to bread wheat," Liu said. "This was bred into TAM 112 through the synthetic wheat cultivar Largo that was released in 1982."

Yan Yang's paper, "Developing KASP Markers on a Major Stripe Rust Resistance QTL in a Popular Wheat TAM 111 Using 90K Array and Genotyping-by-Sequencing SNPs" is scheduled to be published in Crop Science.

"Yan's study identified a group of genes in TAM 111 that showed resistance to stripe rust, a disease that can be very devastating in wheat," Liu said.

TAM 111 was one of the few resistant varieties to stripe rust up until about 2012, when a new race of stripe rust began to be prevalent, he said. Although TAM 111 does not effectively provide resistance in some years, the resistance offered by TAM 111 is still effective in combination with other resistance genes.

These AgriLife Research projects are the effort of a multidisciplinary team, including wheat breeding programs led by Rudd and Dr. Amir Ibrahim in College Station, physiology programs by Dr. Qingwu Xue in Amarillo and Dr. Dirk Hays in College Station, and the Genomic and Bioinformatic Service Center led by Dr. Charlie Johnson in College Station.

Liu said equally important to the student training and research is funding. The funding sources of these research projects were a Monsanto Beachell-Borlaug Scholarship to Assanga and Yang, a Tom Slick Graduate Research Fellowship to Yang and Dhakal, and contributions from AgriLife Research, the Texas Wheat Producers Board and the USDA-NIFA International Wheat Yield Partnership.

Calendar

January

- 24 - Small Grains Advisory Committee - contact Clark Neely cbneely@tamu.edu
- 26 - Texas Watershed Stewards - Brenham more info at: <http://tw.s.tamu.edu>
- 26 - Certified Nutrient Manager workshop - Brenham - contact Michael Kuitu mkuitu@tamu.edu

February

- 1-2 - Soil Survey and Land Resources Workshop - College Station - contact cmorgan@tamu.edu
- 3-5 - American Society of Agronomy Southern Branch annual meeting, Birmingham, AL
- 5 - Faculty Meeting, 1:30
- 6-9 - Phenome 2018, Tucson Arizona
- 7-8 - Soil Survey & Land Resource Workshop, College Station
- 11-13 - Society for Range Management meeting
- 14-17 - American Association for the Advancement of Science, Washington D.C.
- 15 - Certified Nutrient Manager workshop - Palacios - contact Michael Kuitu - mkuitu@tamu.edu
- 15-19 - American Association for the Advancement of Science Annual Meeting - Austin, TX
- 27 - Homeowner Septic System Maintenance class - Seguin contact: Ward Ling - wling@tamu.edu
- 21 - TAMU Plant Breeding Symposium, College Station
- 25 - March 1, 2019 - Turfgrass Ecology & Mgmt. Short Course - College Station

March

- 3-6 - Texas Seed Trade, Austin, TX
- 11-15 - Students' Spring Break
- 15 - Faculty and staff holiday

Save the Date

- April 1-5 - Ranch Management University, College Station
- April 11 - SCSC Student Awards Banquet, Hildebrand Equine Center
- April 25-26 - Bennett Trust Resource Stewardship Conference, Kerrville
- April - Mid-term dossiers to committee
- May 1-2 - 2018 McFadden Symposium - Brookings, SD
- May 2 - midterm dossiers due to Judy Young
- May 15 - Midterm P&T Meeting
- May - Full P&T dossiers due to mentor committee