In This Issue:

Hybrid wheat
Weed management research
New watershed coordinator
New faculty
Department news
Awards
more ....
As we enter the holiday season, we begin to look forward to a Covid vaccine and the pandemic being brought under control. 2020 has been a year to put in the history books, but in many ways great, for our department, including many new research advancements and fresh ideas to explore as we move forward. Our extension team has been fantastic at developing new delivery mechanisms and methods for staying in touch with our clientele and the issues they face. We are thrilled with major grants to advance technology around managing our soils and crops and have welcomed several new faculty during the year that will chart our future.

Our students are winding down their semester. In a few weeks we will be honoring our graduating seniors and those earning advanced degrees. We are thankful that those who choose to will have the opportunity to walk across the stage on December 18 to receive their diplomas. We now need to recruit a new group of students as the market for our students remains strong and the opportunities high.

The Texas Department of Agriculture developed the first set of rules governing industrial hemp growth in Texas. Thanks to Dr. Larry Redmon we developed the protocols for our research and extension efforts and received our first ever hemp research licenses for Texas A&M AgriLife Extension and Research. Dr. Calvin Trostle took over as State Extension Hemp Specialist and more than $1 million was secured in grants and contracts to advance our hemp expertise and support the producers of Texas as they take on production of a new crop.

Congratulations to all who participated in the virtual 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 (see stories pages 5-7). Many other meetings are headed toward virtual or a combination and our faculty will participate in the Texas Plant Protection Assn. Conference and Winter Turfgrass Conference. I will be engaged with the Council for Science Society Presidents, NAREEE and recently became President of Cast. 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. Kudo’s to all the science behind these sessions.

We are currently recruiting for a Soil Pedologist and hope to interview early in 2021. We are anxiously awaiting the impact of Covid on our budget to assess the potential for refilling both our turf and forage specialists in College Station as well as strengthen our overall program.

The department offices will be minimally staffed from Thanksgiving through January 2 as the semester has ended except for on-line finals and Covid issues require care. Fortunately, our team is well set up to work from home and maintain field and lab activity. The New Year starts with a bang with the Beltwide Cotton Conference and our annual all faculty and staff awards meeting.

We wish you all a very Happy Thanksgiving!

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/
New Texas A&M soil scientist digs in
Wyatt to concentrate on soil hydrology, health, sustainability

Determining the impacts of land and water management on crop productivity and soil will keep Briana Wyatt, Ph.D., busy as the newest Texas A&M AgriLife Research soil scientist in the Texas A&M Department of Soil and Crop Sciences.

“In my field of study, soil physics and hydrology, there is really a wide range of hot button issues,” Wyatt said. “Current prominent areas of research range from predicting the future effects of climate change on water availability to developing high resolution, global-scale estimates of soil water availability to using a variety of remote-sensing data to inform land and water management decisions in near-real time.”

Concentrating on soil hydrology

While Wyatt said her research will touch on all these issues, she will concentrate on developing useful applications of meteorological, soil moisture and soil physical property data, and studying the influence of soil moisture on various components of the hydrological cycle and soil health.

“My research generally involves a combination of fieldwork, lab work and computational work,” she said. “In the field, that primarily involves installing and maintaining sensors and taking soil samples that are then analyzed in the lab. I also do quite a bit of computational work in analyzing large datasets, such as long-term monitoring data or remote-sensing data.”

These data may then be used to quantify the magnitude of components of the soil water balance and surface energy balance, including evapotranspiration, soil water storage, deep drainage and runoff, and to determine how these components vary in time and space.

Building a research background

Wyatt earned her bachelor’s degree in environmental science and her master’s and doctorate degrees in soil science, with an emphasis in applied soil physics and hydrology, all from Oklahoma State University. She also completed her post-doctoral work in the Department of Plant and Soil Sciences at Oklahoma State University.

While at Oklahoma State, she worked to update the soil physical property database for the Oklahoma Mesonet, automated environmental monitoring stations located in each county; conducted research related to forecasting seasonal streamflows, estimating potential groundwater recharge, and estimating soil moisture under diverse vegetation types; and also published several Extension publications related to her research work.

Now that she has arrived in Bryan-College Station, Wyatt is looking forward to working with colleagues at Texas A&M and in other organizations throughout the state in order to learn more about the influence of the soil on hydrological processes and to aid in developing improved methods of managing the state’s soil and water resources.

“The overarching goal of my research program is to provide useful information and tools that will allow fellow researchers, land and water managers, and the public to better steward the increasingly threatened soil and water resources of our planet,” Wyatt said.

As she settles in over the next few months, in addition to building her research group, recruiting graduate students and developing collaborations, Wyatt said she will be preparing to co-teach a Water in Soils and Plants course this first year.
Organic, specialty crops get boost with new AgriLife Research breeder

By: Kay Ledbetter

Specialty crops such as barley, guar, lentils and cowpea may not be as well-known as corn, cotton, wheat and sorghum, but Texas A&M AgriLife and the Texas A&M Department of Soil and Crop Sciences are investing in their future with the hire of a new plant breeder.

Waltram Ravelombola, Ph.D., hired in August as a new Texas A&M AgriLife Research organic and specialty crop breeder in Vernon, is already establishing germplasm and developing genomic resources for crops of interest.

“My research focuses on developing specialty crop and row crop cultivars that are suitable to the organic cropping systems in Texas and beyond,” Ravelombola said.

Suitable specialty crops for Texas

Ravelombola said he is using a genome resequencing approach, genotyping-by-sequencing to target traits of interest to growers, such as drought, heat and salt tolerance, enhanced nitrogen fixation in legumes, disease/pest resistance and adaptability to organic farming systems.

In the coming months, Ravelombola said he will focus on generating preliminary data for these traits in order to select parent plants for crossings and to secure further funding support for his program.

Initially, he said he will focus on winter lentils, guar, cowpea and organic barley, working jointly with Texas A&M AgriLife faculty already conducting research with these crops.

“We are seeking to expand the lentil market in Texas to meet national and international demand,” Ravelombola said. “Winter hardiness, food grade and nitrogen fixation are the traits we are focusing on for the lentil project.”

Guar has an established market and is widely grown by farmers around the Vernon area, he said. However, very few guar cultivars are available on the market, making this crop highly vulnerable to climate change and disease/pest outbreaks.

Ravelombola said the cowpea acreage also is significant in Texas. This crop can generate revenue for farmers and is well-suited for crop rotations such as the winter wheat/cowpea rotation.

“I am particularly interested in developing short-season, drought- and heat-tolerant, and biofortified cowpeas,” he said.

Another area Ravelombola said he is excited to start working with is barley.

“The Texas brewing industry has increased at least four times in the last decade,” he said. “This could be a market for barley with good malting properties. In addition, organic barley is still new, and our program would like to catch up on this area.”

Ravelombola said his approach is to integrate conventional and modern tools in plant breeding. His research will focus on understanding the genetic basis of the abiotic and biotic stresses in crops and use genomic selection and high-throughput phenotyping to select varieties best suited to Texas climates.

Research experience

Prior to joining AgriLife Research, Ravelombola was a research assistant for molecular plant breeding and genetics at the University of Arkansas, Fayetteville. His research centered on conducting a genome-wide association study for salt and drought tolerance in cowpea.

Before going to Arkansas to further his studies, Ravelombola was a research assistant for crop improvement and plant protection at the National Center of Research Applied to Rural Development in the Department of Agronomic Research, Antananarivo, Madagascar.

He earned a master’s degree in agricultural engineering from the University of Antananarivo. At the University of Arkansas-Fayetteville, he earned additional master’s degrees in cell and molecular biology and statistics and analytics, as well as a doctorate in horticulture.
National honors bestowed on Texas A&M faculty

Peyton Smith earns Women in Science Mentoring Award; Redmon, Morgan earn Fellows

By: Kay Ledbetter

Faculty and students from the Texas A&M College of Agriculture and Life Sciences Department of Soil and Crop Sciences received recognition Nov. 9-13 by the Crop Sciences Society of America, or CSSA; the American Society of Agronomy, or ASA; and the Soil Sciences Society of America, or SSSA, during their virtual international annual meeting, “Translating Visionary Science to Practice.”

ASA, CSSA, SSSA Women in Science Mentoring Award

Peyton Smith, Ph.D., an assistant professor of soil carbon dynamics in the Texas A&M Department of Soil and Crop Sciences, will receive the Women in Science Mentoring Award by the ASA, CSSA and SSSA. The award recognizes an individual whose efforts have encouraged females in the sciences.

Smith earned graduate degrees from the University of Wisconsin and Yale University, and an undergraduate degree from the University of Washington. Her research focuses on how interacting physical, chemical and biological processes regulate the persistence of soil organic matter. She also investigates how global change influences the soil microbiome and its role in fundamental biogeochemical processes.

Despite being an early career scientist, as a faculty member she has mentored over 30 students and postdoctoral students, many who have secured successful positions in academia or governmental agencies.

Smith is very engaged in undergraduate research, and acts as a primary mentor for an international Research Experiences for Undergraduates, REU, program on tropical biogeochemistry, according to her award recognition. She also co-founded several mentoring networks for women in soil science, including the Texas A&M Chapter of Women in Ag Science, and a nationwide mentoring program, Women in Soil Ecology.

CSSA Fellow

CSSA is recognizing Larry Redmon, Ph.D., Texas A&M AgriLife Extension Service program leader for the Department of Soil and Crop Sciences, Bryan-College Station, as a 2020 Fellow award recipient.

CSSA Fellow is the highest recognition bestowed by the Crop Science Society of America and is presented for outstanding contributions to agronomy through education, national and international service and research.

Redmon is internationally recognized for work in forage management. He has provided leadership for both the American Society of Agronomy and CSSA, as well as at the regional, state and local levels in educational programming and materials development in both Texas and Oklahoma. He currently serves as associate editor for the Agrosystems, Geosciences and Environment journal.

Redmon has garnered $7.8 million in grants, produced 32 refereed journal articles and 98 Extension publications, as a faculty member helped to train 35 graduate students and has participated in 1,275 educational programs with over 82,000 attendees. He has made presentations to delegations from Afghanistan, Azerbaijan, Brazil, Bulgaria, Hungary, Kazakhstan, Mexico, Poland, Tunisia and Venezuela.

He earned a bachelor’s degree in agronomy from Stephen F. Austin State University and a doctorate in range science from Texas A&M. He spent six years with Oklahoma State University before joining AgriLife Extension in 1999 as a forage specialist at Overton. He moved to College Station in 2004.

SSSA Fellow

An SSSA Fellow award will be presented to Cristine Morgan, Ph.D., an adjunct faculty member in the Department of Soil and Crop Sciences, where she was a tenured professor. This recognition is for her innovative research, translating technology to application, research in global soil security, and elevating soil judging to a global competition while at Texas A&M.

The Fellow is the highest recognition bestowed by the SSSA and is presented for outstanding contributions to agronomy through education, national and international service, and research.

Morgan is now chief scientific officer at the Soil Health Institute in Morrisville, North Carolina, where she develops scientific strategy and implementation for the Institute’s research. She earned her bachelor’s degree from Texas A&M in environmental soil and plant sciences and master’s and doctorate in soil science from the University of Wisconsin-Madison.

continued
ASA Carl Sprengel Agronomic Research Award

Wayne Smith, Ph.D., professor, cotton breeder and associate department head in the Department of Soil and Crop Sciences, was honored with the ASA Carl Sprengel Agronomic Research Award, recognizing major research accomplishments resulting from basic or applied research in agronomy.

Smith has served as a cotton breeder for over 45 years, including more than 30 with Texas A&M AgriLife Research. He has developed or co-developed and released 142 upland cotton germplasm lines and five cultivars, his nomination stated.

Smith joined Texas A&M in 1986 following 12 years as a cotton breeder with the Arkansas Agricultural Experiment Station. He is a native of Alabama and a graduate of Auburn University and the University of Tennessee.

ASA Tengtou Agricultural Science Award

Hongbin Zhang, Ph.D., professor of plant genetics, genomics, systems biology and molecular breeding, was presented with the Tengtou Agricultural Science Award, which recognizes those who have made significant contributions to Chinese agriculture with an emphasis on plants.

Zhang’s research is focused on genomics and systems biology in crop plants, particularly development of genomic and systems biological knowledge and new or advanced technologies for enhanced crop research and breeding.

Students receive Diversity in Excellence Fellowships

When we consider diversity, our minds typically turn to racial or ethnic differences. Texas A&M University recognizes that diversity also includes differences in cultural, geographical and educational backgrounds. The Graduate Diversity Excellence Fellowships support high achieving scholars from a wide range of backgrounds, to help increase the diversity of the graduate population of the university.

Two students in the Department of Soil and Crop Sciences were among those selected to received Diversity Excellence Fellowships this fall. Jodie Reisner, a first generation college student and Gustavo Camargo Silva, a native of São Paulo, Brazil, each received a fellowship to help them pursue their degrees.

Reisner is a Ph.D. student studying the use of cover crops as an integrated weed management tool in agroecosystems under the supervision of Dr. Muthu Bagavathiannan, an Associate Professor in the department.

Growing up in Marinette Wisconsin, a city in northeast Wisconsin, she spent much of her spare time at her friend’s dairy farm. Then in the tenth grade Reisner was introduced to environmental science and there was "no turning back". She earned her B.S. in Biology and Environmental Science from the University of Wisconsin and her Master's in Soil Science from the University of Missouri.

"My parents were hard working people who encouraged us to pursue our dreams," Reisner said. "Dr. Muthu presented the opportunity to apply for the Diversity in Excellence Fellowship and it has given me the opportunity to pursue my dream at Texas A&M. I am grateful for that."

Silva is a Master’s student, also under Bagavathiannan, whose research focuses on the suppression of weeds using cover crops.

"Even growing up in the middle of the largest city in South America, I found ways to plant things. I had plants growing in every corner of my apartment," said Silva. "Agronomy was my path out of the city."

While working on his Bachelor's degree at Western Kentucky University, Silva became interested in the use of cover crops to manage weeds. He came to Texas A&M to pursue that research for his Master’s thesis.

"My research focuses on the interactions between cereal ry cover crop and weeds," Silva said. "I am seeking to determine how much weed suppression results from different interctions like nutrient dynamics, soil moisture and phytochrome response."
Texas A&M University Department of Soil and Crop Sciences students were recognized at the recent annual meetings of the Agronomy Society of America, Crop Science Society of America, and the Soil Science Society of America.

Award winners included:

Noah Winans: Frank D. Keim Graduate Fellowship. Winans, from Tekonsha, Michigan, is working on his master’s in plant breeding. The Frank D. Keim Graduate Fellowship is awarded to an outstanding senior who has been accepted for a graduate program in agronomy or related field.

Aniruddha Maity: Nelson Yield-Limiting Factors Graduate Scholarship. Maity, from Kolkata, West Bengal, India, is a doctoral student in plant breeding. The Nelson scholarship is designed to encourage students to pursue research and careers in support of the diagnosis of yield-limiting factors in agronomy. He also received the Outstanding Graduate Student Award with the Association for Agricultural Scientists of Indian Origin during the ASA-CSSA-SSSA meeting.

Rahul Raman and Mark McDonald: SEED Ambassadors. This is an immersive advocacy leadership program designed to develop training to engage with federal, state and local policy makers and strong relationships with U.S. Congressional members.

Gustavo Camargo Silva: Bayer Diversity Initiative Scholar/Early Career. Gustavo, from Sao Paulo, Brazil, is a master’s student in agronomy.

Students also represented the department well in the many competitions held during the virtual conference.

Contest winners included:

Jales Fonseca - 1st place in the C-1 Breeding and Genetics student poster competition at the CSSA Annual Meeting. His poster was titled "Differential genomic prediction capacity of sorghum parents in hybrid combinations across environments".

Morgan McCullough - 3rd place in the C-3, Crop Ecology, Management and Quality, Master’s student poster competition with her poster titled "Evaluating genetic resistance and nematicides to reduce reniform nematode impact in cotton".

Dinesh Phuyal - 2nd in the Global Climate Change Community poster competition with his research poster titled "Climate Smart Farming: A preliminary investigation of Biological Nitrification Inhibition (BNI) in selected sorghum genotypes".

Rahul Raman - 1st in the Precision Agriculture Community poster competition with his poster titled "Efficiency of vegetation indices in detecting wheat leaf rust infection".

Jeffrey Siegfried - 3rd with his oral presentation titled "Airborne and Satellite Remote Sensing Sensing" at the ASA meeting.

Chengsong Hu - 2nd in the Precision Agriculture poster section for his entry titled "Modeling Realistic 3D Plants using Photometric Stereo-based Approach and its Application to Weed Detection".

Rahul Raman - 1st in the Precision Agriculture poster competition with his entry titled "Data-driven Moisture Management for Sand-capped Fairway Systems". He also won the Steigler travel award.

Mark McDonald - 2nd in the Cover Crop Community Ph.D. oral competition with his presentation titled "Increases in Cotton Lint Yield Determined Shortly After Implementing Cover Crops and No-Tillage".

Joseph Burke - 2nd in S4/S8 Ph.D. oral presentation competition with his presentation titled "Nitrogen Management in Conservation Systems to Increase Use Efficiency and Cotton Production".

Walker Crane - 2nd in the SASES visual presentation competition with his presentation title “Effect of Management Practices on Soil Microclimate in Sorghum Cropping Systems”.

Christopher Barron - 1st in the SASES speech contest
One researcher is in Texas. One is in Nebraska. Together, they are striving to launch the hybridized wheat industry.

Hybridization is the cross breeding of two genetically different varieties or species. And much like what has been accomplished in cotton and corn, hybridizing wheat is expected to improve the crop’s strength and health and ability to feed a rapidly growing population.

Amir Ibrahim, Ph.D., Texas A&M AgriLife Research wheat breeder in Texas A&M’s Department of Soil and Crop Sciences, Bryan-College Station, has spent the past seven years studying the hybridization of wheat in a partnership with Stephen Baenziger, Ph.D., University of Nebraska-Lincoln small grains breeder. Ibrahim and Baenziger jointly have tested more than 600 lines of hybrid wheat varieties in Nebraska and Texas, and are now developing the necessary knowledge base, germplasm and enhanced trait pools or patterns from these lines to support the development of hybridized wheat.

Plant breeding partnerships grant

The team’s newest project, “Plant breeding partnerships: Continuing to develop and validate the tools for hybrid wheat,” is supported by a $650,000 U.S. Department of Agriculture National Institute of Food and Agriculture grant.

“Together our project team has made great strides toward developing tools to foster hybrid wheat development to maximize wheat yield potential,” Baenziger said. “This project is expected to help create the scientific and germplasm foundations for successfully launching a U.S. hybrid wheat industry.”

Why hybrid?

Ibrahim explained hybrid crops have increased vigor over the two parents in yield and other traits. In hybrids, the female parent does not produce viable pollen, but is used as a seed plant. The male parent has the role of pollinator. Together they have the capacity to combine and express hybrid vigor.

For wheat, past conventional breeding efforts increased hybrid vigor about 10%, but Ibrahim said they want to raise that figure to 15%-20% to make it attractive to producers.

“We believe hybrid wheat, which is more climate resilient than pure-line wheat, can contribute to achieving this goal,” he said.

Also participating in this latest project are Vikas Belamkar, Ph.D., University of Nebraska geneticist and plant breeder; Bhoja Basnet, Ph.D., International Maize and Wheat Improvement Center, or CIMMYT, hybrid wheat breeder, El Batan, Mexico; and Jochen Reif, Ph.D., Leibniz Institute of Plant Genetics and Crop Plant Science department head, Gatersleben, Germany.

The science needed for cost-effective adoption

Anil Adhikari, Ph.D., a Texas A&M doctoral student who is now at the University of Wisconsin, said for commercial success of hybrid wheat, a cost-effective hybrid seed production method is required. Adhikari worked extensively with Ibrahim on the genetic side of hybridization.

Hybrid seed production based on cytoplasmic male sterility is only feasible if the male lines have fertility-restoring genes, Adhikari said. These genes override the cytoplasmic male sterility in the hybrid seed and make the seeds fertile.

In his study, fertility-restoring genes in a population of 300 recombinant inbred lines. Three consistent major quantitative trait loci, or QTLs, were mapped explaining 18%-40% phenotypic variance. KASP markers were developed using flanking markers of these QTLs.

The KASP markers from this study can be used for characterizing fertility-restoring gene sources and transferring them to male parents in the hybrid breeding program. In addition, the identified candidate genes can serve as a guide to fine map and clone these fertility-restoring genes.

The time has come

To meet population and food projections, the improvement in wheat productivity needs to be between 1.4% and 1.6% per year. Currently, the productivity increase is about 1% or less.

Hybrid wheat appears to be more stable than conventional wheat under stresses, a trait that is growing in importance, Ibrahim said. Also, he knows the research spin-offs from these efforts may have far-reaching improvements for his and other wheat breeders’ conventional pure-line breeding.

“We know hybrid wheat will still take time but based on these tools we have been working with and the results we are seeing, we believe its time has come,” Ibrahim said.
Field testing new integrated weed management strategies

Herbicide-resistant weeds target of $2.23 million Texas A&M AgriLife-led study

By: Kay Ledbetter

A Texas A&M AgriLife-led study will research how well several new weed management strategies can help reduce weeds and mitigate the increasing occurrence of herbicide resistance.

The Texas-led $2.23 million grant — Scaling Up Sustainable Integrated Weed Management Solutions to U.S. Field Crop Producers — is funded by the U.S. Department of Agriculture’s Natural Resources Conservation Service through On-Farm Conservation Innovation Trials, a component of the Conservation Innovation Grants program.

“Herbicide resistance in weeds is a serious problem in many agricultural systems throughout the U.S., increasing the cost of weed control and reducing farmer profits,” said Muthukumar Bagavathiannan, Ph.D., Texas A&M AgriLife Research weed scientist in the Department of Soil and Crop Sciences, Bryan-College Station. “We are equally concerned about the negative impacts of weed resistance on conservation agriculture, as producers return to utilizing tillage to manage the resistant weeds.”

Project aims at weeds and conservation

This project, led by Bagavathiannan, includes a network of scientists in the Getting Rid of Weeds, or GROW, alliance, who will focus on integrated weed management, IWM, to address weed resistance. The work has direct implications for protecting and expanding the agricultural land area under conservation practices.

There has been a lot of growth in conservation tillage — minimum till or no-till practices — especially in the Midwest and Northeast. Conservation tillage has also been gradually increasing in the South, he said. But due to herbicide resistance, farmers are reverting back to tillage to control the resistant weeds.

“Tillage for weed resistance management jeopardizes the conservation gains that have been made over several decades,” said Steven Mirsky, Ph.D., a research ecologist at the USDA-Agriculture Research Service Sustainable Agricultural Systems Laboratory, Beltsville, Maryland, who spearheaded the GROW Areawide project on multi-tactic weed resistance management, which provided the foundational knowledge on the IWM tools studied here.

“The project's focus on implementing non-chemical management tools and being able to prolong the use of available herbicides, thus minimizing the need for farmers to go back to tillage is expected to make tremendous positive impacts on conservation agriculture,” Mirsky said.

Bagavathiannan will be joined on the project by researchers in eight other states in a collaboration with commodity boards, grower networks, and soybean, corn, cotton and wheat producers. The collaborators will work to enhance on-farm adoption of integrated herbicide-resistant weed management with a focus on harvest weed-seed control and cover crops. Precision agriculture and regional expansion of a weed management decision-support tool are other focus areas. The project has received matching funds from DeBruin Engineering of Australia, REDEKOP of Canada, EarthSense Inc. and Cotton Inc.

A new tool in the weed-elimination toolbox

The first effort will be on harvest weed-seed control.

“Weeds that escape the herbicides mature with the crop; during harvest, weed seeds go through the combine and are dispersed throughout the field, contributing to future weed problems,” Bagavathiannan said. “We believe there is an opportunity at harvest to collect these weed seeds and destroy them.”

Different strategies exist to destroy the seed captured by the combine harvester, he said. In this proposal, the team will focus on seed impact mills. The impact mill concept was developed in Australia by a farmer named Ray Harrington to deal with rigid ryegrass seed in wheat. In this approach, the chaff-containing weed seed is separated from straw and is run through an impact mill, which kills weed seeds. Early generation mills were towed behind the combine. The technology has evolved rapidly, and now mills can be directly integrated with combines.

Seed impact mills and other harvest weed-seed control technologies have been broadly adopted by Australian growers. Among the advisors on the project is Michael Walsh, Ph.D., associate professor and director of weed research, University of Sydney. Walsh spent years developing and testing different harvest weed-seed control systems in Australia, including the Harrington Seed Destructor, HSD, and the improved integrated HSD, iHSD.

continued next page
The team is partnering with DeBruin Engineering, Australia, that manufactures iHSD and REDEKOP, a Canadian manufacturer of seed impact mills. This project is acquiring 16 impact mills to be tested across eight U.S. states.

Walsh said introducing harvest weed-seed control as a new weed control technique into Australian cropping required a substantial and concerted effort, and he expects the same to be required in the U.S. “This significant grant will enable the required research and development activities that the U.S. cropping industry needs to be able to adopt these systems with confidence,” he said.

Implementing the technology on U.S. soils

The GROW team members have already conducted preliminary studies on the feasibility of harvest weed seed control for the past five years. Preliminary research data indicates the technology is promising.

Bagavathiannan said most existing data on the efficacy of impact mills on U.S. weeds originate from stationary testing and on-station trials, which show greater than 95% destruction of weed seeds, even seeds smaller than those of pigweeds. “We do need to conduct evaluations on-farm, under realistic production conditions, to demonstrate the potential of this technology, identify areas for further development, and promote farmer adoption,” he said. “This is exactly what this multi-state study is aiming to accomplish.”

The on-farm activities of the project will be conducted on participating farms, ranging in size from 1,000 to 5,000 acres, in three important agricultural regions — North Central, Mid-Atlantic and South Central U.S. Bagavathiannan said the team will integrate cereal rye cover crops with harvest-weed seed control to demonstrate how well these two non-chemical weed management tools can interact with herbicide programs. Field tests in Texas will be in the Upper Gulf Coast area and in the Blacklands region.

The precision agriculture component centers on the development of an image database for important agronomic weeds in the U.S., as well as data flow and cyber infrastructure to facilitate machine learning applications for weed detection and precision management. Drones will be used to assess how IWM practices influence shifts in weed population dynamics and how effectively weed escapes can be spot treated. Field robots will also be utilized for testing ground-level weed detection and actuation systems.

Soil conservation benefits as a result of adopting the IWM solutions will be calculated based on the potential reduction in tillage events that are otherwise required by farmers to manage herbicide-resistant weeds. This reduction will be modeled using WeedRID — a regional IWM decision support tool. The overall conservation benefit calculation will also take into account estimates of how cover crops can reduce herbicide use and decrease weed pressure. The WeedRID model will be parameterized and expanded to include additional weed species, with more regional relevance.

Team members bring diversity to the project

Team members are Adam Davis, Ph.D., University of Illinois; Lauren Lazaro, Ph.D., Louisiana State University AgCenter; Mark VanGessel, Ph.D., University of Delaware; Michael Flessner, Ph.D., and Vijay Singh, Ph.D., Virginia Tech; Prashant Jha, Ph.D., Iowa State University, and Wesley Everman, North Carolina State University, each conducting on-farm experiments in their respective states.

Ankita Raturi, Ph.D., Purdue University, will oversee the development of the web interface and implementation of the WeedRID model. George Frisvold, Ph.D., University of Arizona, is the socio-economist on the project who will coordinate with each region in planning the project research strategy to facilitate tractable economic and social impact analyses.

“Our team has excellent scientists with years of experience in IWM research and has developed close partnerships with equipment companies and commodity support organizations for facilitating IWM adoption in the on-farm trials,” Bagavathiannan said. “We believe this strong partnership will ensure great success of this project.”

Are you interested in cover crops?

You are invited to join a new networking group focused on understanding cover crops in agroecosystems.

Our goal is to share information, research and ideas on how to communicate the science of cover crops to others!
Applying fall preemergence herbicide to avoid spring weeds

By: Adam Russell

As soil temperatures cool, now is the time to plan for preemergence herbicide applications to eradicate common cool-season weeds like annual bluegrass and lawn burweed, said a Texas A&M AgriLife Extension Service expert.

Chrisie Segars, Ph.D., AgriLife Extension turfgrass specialist, Dallas, said homeowners looking to improve the look and feel of their lawns by preventing annual weeds and burs should prepare to apply fall preemergence herbicides. Preemergence herbicides are designed to disrupt the germination and emergence of unfavorable plants.

“Fall weed management is an important part of annual turfgrass maintenance,” she said. “It rids lawns of undesirable plants that compete with our turfgrass and helps your lawn get a good start in the spring.”

Ridding lawns of weeds

Preemergence herbicide treatments in the fall can help rid your lawn of grassy weeds like annual bluegrass and rescuegrass, and broadleaf weeds like henbit, chickweed, Carolina geranium and lawn burweed. Choosing the right herbicide can seem daunting, but AgriLife Extension has a number of publications dedicated to identifying weeds and herbicide selection.

Segars said preemergence active ingredients are an important consideration for tackling unwanted weeds. Products will typically list a range of plants it will control whether perennial or annual and broadleaf plants or grasses. Preemergence herbicides are most effective on annual weeds, while other weeds must be controlled with post-emergence applications.

“Having knowledge of seasonal, chronic weed problems will help you narrow down product choices,” she said. “Choosing the right active ingredient for your problem weeds and applying it correctly are very important to weed management.”

Segars said homeowners who are not comfortable handling or applying chemical products should contact local landscape professionals. You should always follow product labels and distance applications from desirable plants to avoid injuring them.

Preemergence herbicide applications

Segars said AgriLife Extension recommends the fall preemergence herbicide regimen to begin when soil temperatures reach approximately 70 degrees. This generally happens in September or October, depending on where you are in Texas.

“Don’t get into the habit of relying on the same calendar date every year; that’s why we have soil temperature recommendations,” she said. “Environmental conditions can be drastically different from year to year.”

Segars said soil temperature probes, even probe-type meat thermometers, can help homeowners gauge application timing. There are weather-related websites and applications that monitor soil temperatures and even give updates via notifications, she said.

Identifying which weeds you want to control is important for choosing the correct herbicide option, such as broadleaves and grasses or perennial and annual weeds, she said. Segars recommends granular herbicides for homeowners due to ease of application.

“For best results, we generally recommend at least one application of a preemergence herbicide in the spring and fall,” she said. “These two applications, if done properly, can greatly reduce the number of annual weeds in your yard.”

Segars said some homeowners may desire to make a second or split application of preemergence, and it’s a good idea to have both a pre- and post-emergence herbicide on hand for the second application.

“Herbicides aren’t 100% effective every time, especially if you have heavy rains following application or missed the desirable timing,” she said. “Having a mixture of a pre- and post-emergence product just ensures you catch any weeds that break through your original application while they are immature.”

Watering in the preemergence herbicide immediately after application using some type of sprinkler system is recommended. Typically, granular preemergence products need one-quarter to one-half inch of water to dissolve properly, but always follow product label instructions, she advised.

“It’s easy to water in the product, especially if you have an in-ground irrigation system,” she said. “It could be risky trying to time it with rainfall. So, I would recommend using a sprinkler and figuring out how much water it is putting out and how long you’ll need to water to correctly activate the herbicide.”

AgriLife Extension has information regarding irrigation and sprinkler audits that will help homeowners determine how long to irrigate specific amounts. For more information about irrigation, visit the Texas A&M Extension School of Irrigation.

Say ‘no’ to weed and feed in the fall

Weed and feeds are a common and popular product, but Segars does not recommend using them as a fall/winter turfgrass management tool.

“We’re entering a time when warm-season grasses are slowing down in a lot of the state, and we don’t want to fertilize them too late, especially with nitrogen,” she said. “Putting nitrogen down promotes growth, and a quick freeze could cause damage.”

Segars said the last nitrogen application should be no later than four to six weeks before the average date of the first frost.

Scout now for spring application

Segars said now is a good time to scout for summer weeds like crabgrass and sandburs.

“Make note of what weeds you have now, and prepare for spring preemergence application,” she said. “Identify the weeds you have and note where they are. Make a game plan for getting your warm-season grasses off to a good start in the spring.”
Dr. Kazeem and Sarah (Ajayi) Olanrewaju welcomed their first child on October 27. Their baby girl weighed 8 lbs 3 oz. Sarah is a former student from the department. She earned her Ph.D. under Drs. Qingwu Xue and Amir Ibrahim.

Milo Noland welcomed his baby brother, Fritz, into the world on November 11. They are the sons of Dr. Reagan Noland and his wife Stefani. Reagan is an Assistant Professor and AgriLife Extension Agronomist in San Angelo.

Elise Christine Hejl was born October 24 to Reagan and Jessica Hejl. She is their second child, joining big brother Everett. Reagan is a Research Associate and Ph.D. student in water management and hydrological science under Dr. Ben Wherley.

### Calendar

**December**
- 1-2 - Texas Turfgrass Assn. Winter Meeting
- 8-10 - Texas Plant Protection Association meeting
- 18 - College of Agriculture and Life Sciences graduation - 9:00 a.m.
- 23- Jan. 4 - Department offices closed for the holidays

**January**
- 14 - State of AgriLife Address
- 14 - Department of Soil and Crop Sciences Annual Meeting and Awards Presentation
- 15 - Texas Wheat meeting
- 19 - First day of spring semester classes

**February**
- 2-4 - Southwest Cotton Physiology virtual meeting