January
February
March
2016

The Department of Plant and Soil Science

NEWSLETTER

this issue

New Faculty Hire: Dr. Benildo de los Reyes

Benildo G. de los Reyes, an expert molecular geneticist, has been named professor of plant genomics and Bayer CropScience Chair with Texas Tech's Department of Plant and Soil Science. He officially stepped into his new research and teaching post on Jan. 1.

Dr. De los Reyes indicated that breeding the next generation of climate-resilient crops will have to rely on innovative research that could create novel plant attributes yet to be achieved by decades of molecular plant breeding and genetic engineering. By employing a genome-centered research paradigm on a tractable reference crop species such as rice, his laboratory is establishing the foundation for creating complex genomic and epigenomic configurations that could lead to novel stress physiological attributes.

Dr. De los Reyes' laboratory is currently investigating mechanisms built upon the power of regulon restructuring, regulatory RNAs, and DNA methylation to understand the intricate processes by which novel gene expression patterns mediate transgression from parental phenotypes. The transformative knowledge uncovered by his current research on rice is being translated to other major crops of economic importance to the state of Texas including cotton and sorghum. His research is currently supported by the National Science Foundation-Plant Genome Research Program.

Prior to joining the Tech faculty, De los Reyes was a tenured faculty member at the University of Maine's School of Biology and Ecology, and Department of Molecular and Biomedical Sciences, moving through the ranks of assistant professor, associate professor and professor of molecular genetics from 2004 to 2012. He also served as the school's associate director until his departure in December 2015 to join the faculty of Plant and Soil Science at Texas Tech.

Dr. De los Reyes received his bachelor of science degree in biology with a concentration in genetics from the University of the Philippines-Los Banos. His master's degree in genetics and biochemistry was from the University of the Philippines-Los Banos and the International Rice Research Institute. He obtained his Ph.D. in plant science with concentration in cellular and molecular biology at Oklahoma State University.

He has received several awards including the International Collaborative Research Fellowship from the National Institute of Genetics in Japan (2011), the Balik Scientist Award from the Department of Science and Technology-Republic of the Philippines (2008), Graduate Research Excellence Award in Biological Science from Oklahoma State University (1999), Gerard Mott Meritorious Graduate Student Award from the Crop Science Society of America (1998), Outstanding Researcher in Rice Genetics from the International Rice Research Institute (1994), and Rice Genome Fellowship from Japan Rice Genome Program (1993). *Narrative written by Norman Martin, CASNR Dean's Office*

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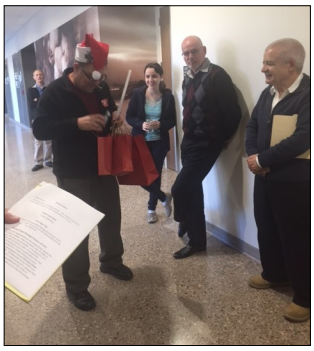
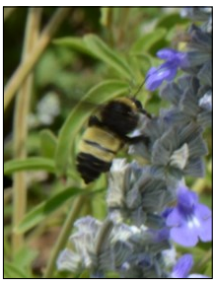
We recently celebrated the retirement of Dr. Steve Maas. We wish Dr. Maas all the best in his retirement, and thank him for his contributions to the department and Texas Tech. Here are a few pictures from his reception.



Grant & Research Update

Pollinator decline, highlighted in part by colony collapse disorder in honey bees and declines in the numbers of overwintering monarch butterflies in Mexico, has become an important issue for natural resource conservation in agriculture. In addition to a major focus on managed honey bees regarding pollinator decline, recent studies have shown the positive contributions of diverse native bee communities to agricultural production. A three-year research project focused on pollinator conservation and led by Department of Plant and Soil Science faculty was recently funded ($380,579) through the 2015 USDA Conservation Innovation Grant program. A main goal of the project is to develop information that assists producers in adopting conservation practices to promote pollinator health through studies that address habitat resources of pollinators on existing agricultural lands and potential changes to pollinator communities following the establishment of on-farm conservation practices. Studies that address plant attractiveness to pollinators, wildflower seed-mix growth, and interactions of honey bees and native bees in pollinator habitat will be conducted to help improve conservation practices to support native bees. Information from the project will be highlighted through pollinator conservation practice demonstration days in collaboration with the USDA Natural Resource Conservation Service, the first held at Bingham Family Vineyards and Farms in summer 2016. A related pollinator conference, the 2016 Pollinator PowWow will be held at the Museum of Texas Tech University on April 22nd-24th to bring together experts in pollinator biodiversity and conservation from Texas and other regions of the U.S. Members of the research team conducting the USDA CIG project include Scott Longing, Cynthia McKenney, and Chuck West from PSS and Robert Cox (Natural Resources Management) and Nancy McIntyre (Biological Sciences). The interdisciplinary team will combine areas of expertise in entomology, horticulture, rangeland and forage ecology, and landscape ecology to address pollinators, while training two master's students and one doctoral student.



Images left to right: American bumble bee, *Bombus pensylvanicus,* a leafcutter bee, and a sweat bee, establishing the circle plots at PSS Quaker Avenue Research Farm to assess plant attractiveness to pollinators.

Grant & Research Update Cont.

Over the last couple decades, the primary target market for cotton producers has shifted from the domestic production of rotor-spun yarns toward international markets focused on the production of ring-spun yarns. Ring-spinning is a more labor intensive process that results in higher value yarns that are used in the manufacture of more premium textiles. The shift to a ring-spinning market has placed more stringent demands on cotton producers in terms of fiber quality. Drs. Eric Hequet and Brendan Kelly of the Fiber and Biopolymer research institute (FBRI) were awarded $425,478 from Cotton Inc. for a series of four projects addressing the challenges involved with producing cotton fiber competitive as a raw material on international spinning markets.

Cotton is an indeterminate crop where bolls from the top of the plant are set later in the season and often develop under less than optimal conditions. Poor developmental conditions will lead to shorter fibers and a lack of cellulose deposition. When harvested with a stripper harvester, the primary harvest method on the High Plains, these top bolls will be included in the harvest. The poorly developed immature fibers contributed by the top-crop will tend to break and entangle during mechanical processing (ginning, carding, etc.) leading to poor fiber length distribution and excessive nep count (fiber entanglement). In turn, this will result in poor yarn and fabric quality. Results obtained from a previous project demonstrated that some varieties produce more stable fiber quality profiles within the canopy. This led us to develop a project aimed at developing strategies for identifying germplasm with a more stable distribution of fiber quality within the canopy.

A second project, also aimed at improving textile performance, will concentrate on fiber elongation. The manufacture of stronger yarns depends on both the strength and elongation of the cotton fiber. However, most of the cotton breeding industry relies on High Volume Instrument (HVI) bundle strength while ignoring HVI elongation. The main reason for this lack of interest in elongation is the absence of HVI calibration for elongation in cotton. Results obtained at the FBRI during the initial phase of this project reveal the HVI elongation measurement is stable and can be calibrated. In this phase of the project, a set of standards will be developed for implementing a calibration protocol, thus enabling the high speed evaluation of cotton fiber elongation. Improving fiber elongation of new cultivars, everything else being constant, will lead to less fiber breakage during mechanical processing, better fiber length distribution, and ultimately better textile products.

Cotton fiber length is not solely determined in the field. The natural development of cotton fiber, along with the mechanical processes required to transform the fiber from field to spun yarn, contribute to within sample variation in cotton fiber length. The within sample distribution of fiber length is believed to be encoded with information about variation in other fiber qualities such as maturity and fineness. The team at the FBRI developed a multivariate statistical method that provides a basis for direct analysis of these complex relationships. These relationships will be further investigated in an attempt to elucidate the impact of fiber maturity on the within sample distribution of fiber length.

Breeders need measurement protocols capable of capturing the within sample distribution of fiber length in order to develop cotton varieties of the future. The most widely used method of evaluating the within sample distribution of cotton fiber length, the Advanced Fiber Information System (AFIS), is too slow for application in most breeding programs. Attempts made at speeding up current AFIS protocols have not produced results suitable for breeding efforts. In the final project, new tools and novel measurement protocols will be investigated for evaluating within sample variation in cotton fiber length.

Faculty News

Dr. Cynthia McKenney was selected as an Integrated Scholar for the 2015-2016 school year. Only 11 faculty members were chosen from the university.

Drs. Venugopal Mendu and David Weindorf are the recipients of Borlaug fellow from Ethiopia through the Norman E. Borlaug International Agricultural Science and Technology Fellowship Program . The fellow is Tesfaye Disassa Bitema from the National Biotechnology Research Center of the Ethiopian Institute of Agricultural Research. Tesfaye will be with PSS for 12 weeks conducting research.

The following publications and presentations were recently completed:

- Weindorf, D.C., S. Chakraborty, A. Aldabaa, L. Paulette, G. Corti, S. Cocco, E. Michéli, D. Wang, B. Li, T. Man, A. Sharma, and T. Person. 2015. Lithologic discontinuity assessment in soils via portable x-ray fluorescence spectrometry and visible near-infrared diffuse reflectance spectroscopy. Soil Sci. Soc. Am. J. doi:10.2136/sssaj2015.04.0160.
- Sevostianova, E., S. Deb, M. Serena, D. VanLeeuwen, and B. Leinauer. 2015. Accuracy of two electromagnetic soil water content sensors in saline soils. Soil Science Society of America Journal 79(6): 1752–1759. DOI: 10.2136/sssaj2015.07.0271. URL: http://dx.doi.org/10.2136/sssaj2015.07.0271
- Yang, Z., B. Nguyen, and R.J. Wright. 2015. Physical Mapping B_{12} Resistance in Cotton. Plant Cell Biotechnology and Molecular Biology 16(1&2):1-11.
- Kebede, H., P. Payton, H. Pham, R. D. Allen, and R.J. Wright. 2015. Toward coalescing gene expression and function with QTLs of water-deficit stress in cotton. International Journal of Plant Genomics. Volume 2015 (2015), Article ID 892716 11 pages http://dx.doi.org/10.1155/2015/892716.
- Udeigwe, T.K., J. Young, T. Kandakji, D.C. Weindorf, M.A. Mahmoud, and M.H. Stietiya. 2015. Elemental quantification, chemistry, and source apportionment in golf course facilities in semi-arid urban landscape using portable x-ray fluorescence spectrometer. Solid Earth 6: 415-424
- Vipan K., T.K. Udeigwe, E.L. Clawson, R. Rohli, and D.K. Miller. 2015. Crop water use and stage-specific crop coefficients for irrigated cotton in mid-south United States. Agricultural Water Management, 156: 63-69
- Elshahawy, A.S, T.K. Udeigwe, and M.A Mahmoud. 2015. Alterations in soil chemical properties induced by continuous rice cultivation: A study on the arid Nile Delta soils of Egypt. Land Degreation and Development. DOI: 10.1002/ldr.2409
- Menkiti, M.C., C.M. Agu, and T.K. Udeigwe. 2015. Extraction of oil from Terminalia catappa L.: Process parameter impacts, kinetics, and thermodynamics. Industrial Crops and Products 77: 713-723
- Kandakji, T., and T.K. Udeigwe, D. Athanasious, and S. Pappas. 2015. Chemistry of arsenic in semi-arid alkaline soils of the Southern High Plains, USA: Sorption characteristics and interaction with soil constituents. Water, Air, and Soil Pollution 226(9): 1-11
- Kandakji, T., T.K. Udeigwe, R. Dixon, and L. Li. 2015. Groundwater-induced alterations in elemental concentration and interactions in semi-arid soils of the Southern High Plains, USA. Environmental monitoring and assessment 187(11): 1-11

PSS News

Dr. Thayne Montague and Diann Merriman completed the CASNR's Advising Academy training during the fall semester. The training focused on preparing the departments to advise more effectively and provide consistency throughout the college. Here is a link to more information on the advising academy: http://www.depts.ttu.edu/agriculturalsciences/news/?p=6230#more-6230

PSS Instructor, Russ Plowman, has created a design for the Horticulture Garden Renovation Proposal. You can visit the plan and virtual tour on the PSS webpage: http://www.pssc.ttu.edu/gardenreno/default.html

The Between Sky and Earth video trailer is now available! Check it out: https://www.youtube.com/watch?v=lHGCdlI91sg&feature=youtu.be

The Department of Plant and Soil Science was pleased to welcome Dr. Steve Driese from Baylor University to give an invited lecture on paleosols in celebration of the International Year of the Soils lecture series.

Important Dates

January:

14: New Graduate Student Orientation

18: University Holiday

21: First day of Spring 2016 classes

26: Last day to add a course

February

5: Last day to drop a course and have it removed

17: Last day to withdraw and receive partial credit

March

14-18: Student Holiday: Spring Break

18: University Holiday

28: No classes

31: Last day to drop a course

If you have questions or comments regarding any information on this newsletter, or to be removed from the PSS distribution database, please contact Christi Chadwell, Communications and Recruiting Coordinator, Christi.chadwell@ttu.edu

PSS Student News

The following students graduated in December 2015: Cassie Franke (Welker) - MS in PSS, Robert Ballesteros - BS in PLSS, Prativa Gautam - MS in Horticulture, Daniel Bingham - BS in HTS, Mamatha Kakarla - PhD in PSS, Allison Cameron – BS in ECSS, Charles Langdon – MS in PSS, Moorilee Edwards - BS in HTS, Kolby Mccormick - MS in PSS, Kane Isaacks - BS in ECSS, Daria McKelvey - MS in Horticulture, Jessica Lefors - BS in HTS, Jed Moorhead - PhD in PSS, Morgan Martin - BS in PLSS, Pablo Tovar – MS in PSS, Sherah Mills - BS in PLSS, Michael Munoz - BS in PLSS, Roberto Pando – BS in HTS, Jorge Penso - BS in ECSS, Tanner Welch - BS in HTS.

Alicia Patridge, PSS graduate student, presented a poster at the Entomological Society of America 2015 Conference. The poster was titled "Relationships of bees and urban lawn characteristics in Lubbock, TX, USA," and the authors were Alicia Patridge, Samuel Discua, Scott Longing, and Cynthia McKenney . Samuel Discua, PSS graduate student, also presented a poster at the ESA Conference. His poster was titled "Diversity patterns of native bees (Hymenoptera: Apoidea) across native prairies and croplands on the Southern High Plains (Texas, USA) " and the authors were Samuel Discua and Scott Longing.

Deepika Misra, PSS graduate student, was awarded 1st place at the poster presentation at the Association for the advancement of industrial crops conference in October 2015.

The PSS Interior Plants class completed a renovation of the foliage planting in the PSS atrium. Students helped create the design and install the planting using plants from the university greenhouse.

TAWC Upcoming Event

The Texas Alliance for Water Conservation is holding its second annual Water College on January 20 at the Bayer Museum of Agriculture. The speaker lineup will include experts on efficient irrigation management, and the keynote will be given by Texas Commissioner of Agriculture, Sid Miller. Attendance is free and details are at tawcwatercollege.com.

Alumni Spotlight

Dale Swinburn graduated from TexasTech in 1965 with a B.S. in Agronomy. He has farmed since graduation and is a partner in Windstar, Inc., a cotton ginning and investment company. Mr. Swinburn is also a member of the PSS Advisory Board.

He married Cheryl Culwell Swinburn and they are the parents of three sons, Chad, Scot and Dane. He also has 5 grandchildren. Dale is a very passionate Red Raider and dedicated supporter of Plant and Soil Science.

PSS Graduate Program Review

We are in the process of compiling data and information for the upcoming PSS Graduate Program Review. The reviewers will be on-campus sometime in the spring to asses all of our past and current graduate programs from 2009 to present. Be on the look-out for more information to come as their visit gets closer.