

Shuyu Liu

Assistant Professor in Small Grain Genetics and Genomics, Texas A&M AgriLife Research, Texas
A&M University System, Amarillo, TX 79106, USA.

Ph: 806-677-5607, Email: SLiu@ag.tamu.edu

Education/Training

2003 Ph.D. Plant Breeding and Genetics, University of Missouri-Columbia, Columbia, MO, USA

2003 M.S. Candidate, Bioinformatics, completed courses, University of Missouri-Columbia, MO, USA

1998 M.S. Plant Breeding and Genetics, Colorado State University, Fort Collins, CO, USA

1988 B.S. Crop Science, Shandong Agricultural University, Taian, Shandong, China

Positions and Employment

2010 – Present: Assistant Professor, Small Grain Genetics and Genomics, Texas A&M AgriLife
Research, Texas A & M University System

2007 – 2010: Research Scientist, Small Grain Breeding and Genomics, Department of Crop and Soil
Environmental Sciences, Virginia Tech

2003 – 2007: Biologist and Visiting Fellow, Harrow Research and Development Center, Agriculture and
Agri-Food Canada, Harrow, ON, Canada

1988 - 1996: Wheat breeder, Shandong Academy of Agricultural Sciences, Jinan, Shandong, China

Program Overview

My research focuses on the genetic and genomic studies of important traits of wheat in the US Great Plains. Traits include drought and heat tolerance, resistance to diseases (leaf, stem and stripe rusts, wheat streak mosaic virus), and arthropods (greenbug, hessian fly, and wheat curl mite) as well as good end-use quality. Both traditional and molecular breeding techniques are used to develop germplasm lines with one or more target traits. Genomic techniques include gene/QTL mapping, molecular marker identification, validation and utilization, high throughput Kompetitive allele specific PCR (KASP) single nucleotide polymorphism (SNP) screening, and gene cloning. Association mapping, genomic selection, and gene functional analyses are being used to understand and improve those target traits.

Significant 5 Year Accomplishments

Research: Acquired \$8.85 M of which \$1.02 M went to my wheat genetic program. Applied 90K SNP array screening on multiple mapping populations. Conducted genes and quantitative trait loci (QTL) analyses on those important traits, including wheat rusts, wheat streak mosaic virus, wheat curl mite and greenbug, drought and heat tolerance. Analyzed QTL by QTL and QTL by environmental interactions for those important traits such as yield and yield components. Developed high throughput molecular markers, KASP SNPs for Gb3, wsm2, H32, Gbx2, and wheat curl mite resistance. Bred germplasm lines and cultivars with multiple tolerances to stresses. Applied association mapping and genomic selections in breeding of complex traits. Since 2010, I published 30 peer reviewed papers and participated the release of 12 wheat cultivars. Teaching and service: Supervised two postdoctoral research associates/research scientists, chaired for 3 Ph. D. students, and committee in 5 Ph. D. and 4 M.S. students. Served as chairs and members in professional societies, journal reviewer, and associate editors.

Publications

Ten most recent publications (52 total)

1. **Liu, S.Y.***, S. Ocheya, S. Dhakal, X. Gu, C.-T. Tan, Y. Yang J.C. Rudd, D.B. Hays, A.M. Ibrahim, Q. Xue, S. Chao, R. Devkota, C. Shachter, T. Huggins, S. Mohammed, M.P. Fuentealba. 2015. Validation of chromosomal locations of 90K array SNP in US wheat. *Crop Sci.* In Press. doi: 10.2135/cropsci2015.03.0194 *Corresponding author
2. **Liu, S.Y.***, J.C. Rudd, G. Bai, S.D. Haley, A.M.H. Ibrahim, Q. Xue, D.B. Hays, R.A. Graybosch, R.A. Devokota, P.S. Amand. 2014. Molecular markers linked to important genes in hard winter wheat. *Crop Sci.* 54:1304–1321. doi: 10.2135/cropsci2013.08.0564. *Corresponding author.
3. **Reddy, S.K., S.Y. Liu***, J.C. Rudd, Q. Xue, P. Payton, S.A. Finlayson, J. Mahan, A. Akhunova, S.V. Holalu, N. Lu. 2014. Physiology and transcriptomics of water-deficit stress responses in wheat cultivars, TAM 111 and TAM 112. *J. Plant Physiol.* 171:1289–1298. *Corresponding authors. DOI: 10.1016/j.jplph.2014.05.005.
4. Pradhan, G., Q. Xue, J. C. Rudd, K. E. Jessup, **S.Y. Liu**, R. N. Devkota, and J. R. Mahan. 2014. Cooler Canopy Contributes to Higher Yield and Drought Tolerance in New Wheat Cultivars. *Crop Sci.* 54:2275–2284. doi:10.2135/cropsci2013.11.0788
5. Xue, Q., J.C. Rudd, **S.Y. Liu**, K.E. Jessup, R.N. Devkota, and J.R. Mahan. 2014. Yield determination and water use efficiency of wheat under water-limited conditions in the U.S. Southern High Plains. **Crop Sci.** 54:34–37. doi: 10.2135/cropsci2013.02.0108.
6. **Reddy, S.K., Y. Weng***, J.C. Rudd, A. Akhunova, **S.Y. Liu***. 2013. Transcriptomics of induced defense responses to greenbug aphid feeding in near isogenic wheat lines. *Plant Sci.* 212:26–36. *Corresponding authors. DOI: 10.1016/j.plantsci.2013.08.002
7. **Liu, S.Y.***, C.A. Griffey*, M.D. Hall, A.L. McKendry, J. Chen, W.S. Brooks, G. Brown-Guedira, D. Van Sanford, and D.G. Schmale. 2013. Molecular characterization of field resistance to Fusarium head blight in two U.S. soft red winter wheat cultivars. **Theor. Appl. Genet.** 126:2485–2498. *Corresponding authors. doi: 10.1007/s00122-013-2149-y
8. Christopher, M.D., **S.Y. Liu**, M.D. Hall, D.S. Marshall, M.O. Fountain, J.W. Johnson, E.A. Milus, K.A. Garland-Campbell, X. Chen, and C.A. Griffey. 2012. Identification and mapping of adult plant stripe rust resistance in soft red winter wheat VA00W-38. **Crop Sci.** 52:871–879. doi: 10.2135/cropsci2012.02.0086.
9. Christopher, M.D., **S.Y. Liu**, M.D. Hall, D.S. Marshall, M.O. Fountain, J.W. Johnson, E.A. Milus, K.A. Garland-Campbell, X. Chen, and C.A. Griffey. 2013. Identification and mapping of adult-plant stripe rust resistance in soft red winter wheat cultivar USG 3555. **Plant Breed.** 132:53–60. Doi:10.1111/pbr.12015.
10. Berger, G.L. **S.Y. Liu**, M.D Hall, W.S. Brooks, S. Chao, G.J. Muehlbauer, B-K Baik, B. Steffenson, C.A. Griffey. 2013. Marker-trait associations in Virginia Tech winter barley identified using genome-wide mapping. **Theor. Appl. Genet.** 126:693–710.

Awards and Honors

1. 2015 TAMU College of Agriculture and Life Science Dean’s Outstanding Research Achievement Award for Interdisciplinary Research Team, Wheat Improvement Team.
2. Visiting Fellowship from Agriculture and Agri-Food Canada awarded by Natural Sciences and Engineering Research Council of Canada from 2004 to 2006.
3. Two Ph.D. students are funded by Monsanto Beachell Borlaug International Scholarship. One of them also received Borlaug Leadership Enhancement Agricultural Program and Borlaug Next Generation Delegate in 2014.