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***Education***

2009 – 2014 China Agricultural University, China. Ph.D., Plant Genetics & Breeding

2005 – 2009 Shandong Agricultural University, China. B.S., Biotechnology

***Professional Experience***

2023 – present Assistant Professor, Texas Tech University

2021 – 2023 Researcher 5, The University of Minnesota, Twin Cities

2019 – 2021 Postdoctoral Research Associate, The University of Minnesota, Twin Cities

2018 – 2019 Postdoctoral Research Associate, The University of Tennessee, Knoxville

2015 – 2018 Postdoctoral Research Associate, Oak Ridge National Laboratory

2014 – 2015 Lecturer, Shandong Agricultural University, China.

***Editorial Position***

Associate Editor, Plant Cell, Tissue and Organ Culture (PCTOC)

Co-editor, Special Issue entitled “Genome Editing and New Plant Breeding Technologies”, PCTOC

***Patents***

1. Yang, X., **Liu, D.**, Hu, R., Tuskan, GA., Genes for enhancing salt and drought tolerance in plants and methods of use. US11535860B2
2. Yang, X., Tuskan, GA., **Liu, D.**, Hu, R., Chen, JG., Xie, M., Genes for enhancing drought and heat tolerance in plants, and methods of use. US11041164B2
3. Liu, Q., Zhai, H., He, S., Wang, L., **Liu, D.**, A salt tolerance-related protein IbEST from sweetpotato and its encoding gene and application, CN103204915B
4. Liu, Q., Zhai, H., He, S., **Liu, D.**, Plant salt tolerance-related protein IbERD3 and encoding gene and application. CN104004071B
5. Shi, C., Liu, H., **Liu, D.**, Sun, Z., Guo, F., A cultivation method for improving the storage root quality of edible sweetpotato. CN104303779B

***Publications***

1. **Liu, D.**, Myers, EA., Xuan, S., Prichard, LE., Donahue, LI., Ellison, EE., Starker, CG., Voytas, DF., 2024. Heritable, multinucleotide deletions in plants using viral delivery of a repair exonuclease and guide RNAs. *Plant Physiology*, kiae015.
2. **Liu, D.**, Tang, D, Xie, M., Zhang, J., Zhai, L., Mao, J., Luo, C., Lipzen, A., Zhang, Y., Savage, E., Yuan, G., Guo, HB., Tadesse, D., Hu, R., Jawdy, S., Cheng, H., Li, L., Yer, H., Clark, MM., Sun, H., Shi, J., Budhathoki, R., Kumar, R., Kamuda, T., Li, Y., Pennacchio, C., Barry, K., Schmutz, J., Berry, R., Muchero, W., Chen, JG., Li, Y., Tuskan, GA., Yang, X., *Agave REVEILLE1* regulates the onset and release of seasonal dormancy in *Populus*. *Plant Physiology*, 191(3), 1492-1504.
3. **Liu, D.**, Xuan, S., Prichard, LE., Donahue, LI., Pan, C., Nagalakshmi, U., Ellison, EE., Starker, CG., Dinesh-Kumar, SP., Qi, Y., Voytas, DF., 2022. Heritable base-editing in *Arabidopsis* using RNA viral vectors. *Plant Physiology*, 189(4), 1920-1924.

4. Hu, R., Zhang, J., Jawdy, S., Sreedasyam, A., Lipzen, A., Wang, M., Ng, V., Daum, C., Keymanesh, K., **Liu, D.**, Lu, H., Ranjan, P., Chen, J.G., Muchero, W., Tschaplinski, T.J., Tuskan, G.A., Schmutz, J., Yang, X., 2022. Comparative genomics analysis of drought response between obligate CAM and C<sub>3</sub> photosynthesis plants. *Journal of Plant Physiology*, 277, 153791.
5. **Liu, D.**, Hu, R., Zhang, J., Guo, H.B., Cheng, H., Li, L., Borland, A.M., Qin, H., Chen, J.G., Muchero, W., Tuskan, G.A., and Yang X., 2021. Overexpression of an *Agave* phosphoenolpyruvate carboxylase improves plant growth and stress tolerance. *Cells*, 10(3), 582.
6. Yang, X., **Liu, D.**, Lu, H., Weston, D.J., Chen, J.G., Muchero, W., Martin, S., Liu, Y., Hassan, M.M., Yuan, G. and Kalluri, U.C., 2021. Biological Parts for Plant Biodesign to Enhance Land-Based Carbon Dioxide Removal. *BioDesign Research*, Article ID 9798714.
7. Yang, X., Medford, J.I., Markel, K., Shih, P., De Paoli, H.C., Trinh, C.T., McCormick, A.J., Ployet, R., Hussey, S.G., Myburg, A.A., Jensen, P.E., Hassan, M.M., Zhang, J., Muchero, W., Kalluri, U.C., Yin, H., Zhuo, R., Abraham, P., Chen, J.G., Weston, D., Yang, Y., **Liu, D.**, Li, Y., Labbe, J., Yang, B., Lee, J., Cottingham, R.W., Martin, S., Lu, M., Tschaplinski, T.J., Yuan, G., Lu, H., Ranjan, P., Mitchell, J., Wullschleger, S.D., Tuskan, G.A., 2020. Plant Biosystems Design Research Roadmap 1.0. *BioDesign Research*, Article ID 8051764.
8. Yuan, G., Hassan, M.M., **Liu, D.**, Lim, S.D., Yim, W.C., Cushman, J.C., Markel, K., Shih, P.M., Lu, H., Weston, D.J., Chen, J.G., Tschaplinski, T.J., Tuskan, G.A., Yang, X., 2020. Biosystems Design to Accelerate C<sub>3</sub>-to-CAM Progression. *BioDesign Research*, Article ID 3686791.
9. Zhang, J., Hu, R., Sreedasyam, A., Lipzen, A., Wang, M., Garcia, T., Yerramsetty, P., **Liu, D.**, Ng, V., Schmutz, J., Cushman, J., Borland, A.M., Pasha, A., Provar, N., Chen, J.G., Muchero, W., Tuskan, G.A., Yang, X., 2020. Expression atlas and co-expression network reveal effects of light quality and intensity in *Kalanchoë fedtschenkoi*, a plant with crassulacean acid metabolism. *GigaScience*, 9(3), gaa018.
10. **Liu, D.**, Chen, M., Mendoza, B., Cheng, H., Hu, R., Li, L., Trinh, C.T., Tuskan, G.A., and Yang X., 2019. CRISPR/Cas9-mediated targeted mutagenesis for functional genomics research of crassulacean acid metabolism plants. *Journal of Experimental Botany*, 70, 6621-6629.
11. Yang, X., **Liu, D.**, Tschaplinski, T.J., Tuskan, G.A., 2019. Comparative genomics provides new insights into the evolutionary mechanism and gene function in CAM plants. *Journal of Experimental Botany*, 70, 6539-6547.
12. **Liu, D.**, Palla, K., Hu, R., Moseley, R., Mendoza, C., Chen, M., Abraham, P., Labbé, J., Kalluri, U., Tschaplinski, T.J., Cushman, J., Borland, A.M., Tuskan, G.A., Yang, X., 2018. Perspectives on the basic and applied aspects of crassulacean acid metabolism (CAM) research. *Plant Science*, 274, 394-401.
13. Lim, S., Yim, W., **Liu, D.**, Hu, R., Yang, X., Cushman, J., 2018 A *Vitis vinifera* basic helix-loop-helix transcription factor enhances plant cell size, vegetative biomass, and reproductive yield. *Plant Biotechnology Journal*, 16, 1595-1615.
14. Yang, X., Hu, R., Yin, H., Jenkins, J., Shu, S., Tang, H., **Liu, D.**, Weighill, D.A., Yim, W.C., Ha, J., Heyduk, K., Goodstein, D.M., Guo, H.B., Moseley, R.C., Fitzek, E., Jawdy, S., Zhang, Z., Xie, M., Hartwell, J., Grimwood, J., Abraham, P.E., Mewalal, R., Beltrán, J.D., Boxall, S.F., Dever, L.V., Palla, K.J., Albion, R., Garcia, T., Mayer, J., Lim, S.D., Wai, C.M., Peluso, P., Van Buren, R., De Paoli, H.C., Borland, A.M., Guo, H., Chen, J.G., Muchero, W., Yin, Y., Jacobson, D.A., Tschaplinski, T.J., Hettich, R.L., Ming, R., Winter, K., Leebens-Mack, J.H., Smith, J.A.C., Cushman, J., Schmutz, J., Tuskan, G.A., 2017. The *Kalanchoë* genome provides insights into convergent evolution and building blocks of crassulacean acid metabolism. *Nature Communications*, 8, 1899.
15. **Liu, D.**, Mewalal, R., Hu, R., Tuskan, G.A., Yang, X., 2017. New technologies accelerate the exploration of non-coding RNAs in horticultural plants. *Horticulture Research*, 4, 17031.
16. Li, R., Kang, C., Song, X., Yu, L., **Liu, D.**, He, S., Zhai, H., Liu, Q., 2017. A  $\zeta$ -carotene desaturase gene, *IbZDS*, increases  $\beta$ -carotene and lutein contents and enhances salt tolerance in transgenic sweetpotato. *Plant Science*, 262, 39-51.

17. **Liu, D.**, Hu, R., Palla, K.J., Tuskan, G.A., Yang, X., 2016. Advances and perspectives on the use of CRISPR/Cas9 systems in plant genomics research. *Current Opinion in Plant Biology*, 30,70-77.
18. Li, R., Zhai, H., Kang, C., **Liu, D.**, He, S., Liu, Q., 2015. *De Novo* transcriptome sequencing of the orange-fleshed sweet potato and analysis of differentially expressed genes related to carotenoid biosynthesis. *International Journal of Genomics*, 43802.
19. **Liu, D.**, He, S., Song, X., Zhai, H., Liu, N., Zhang, D., Ren, Z., Liu, Q., 2015. *IbSIMT1*, a novel salt-induced methyltransferase gene from *Ipomoea batatas*, is involved in salt tolerance. *Plant Cell, Tissue and Organ Culture (PCTOC)*, 120, 701-715.
20. Chen, W., He, S., **Liu, D.**, Patil, G.B., Zhai, H., Wang, F., Stephenson, T.J., Wang, Y., Wang, B., Valliyodan, B., Nguyen, H.T., 2015. A sweetpotato geranylgeranyl pyrophosphate synthase gene, *IbGGPS*, increases carotenoid content and enhances osmotic stress tolerance in *Arabidopsis thaliana*. *PLoS One*, 10, p.e0137623.
21. **Liu, D.**, He, S., Zhai, H., Wang, L., Zhao, Y., Wang, B., Li, R., Liu, Q., 2014. Overexpression of *IbP5CR* enhances salt tolerance in transgenic sweetpotato. *Plant Cell, Tissue and Organ Culture (PCTOC)*, 117, 1-16.
22. **Liu, D.**, Wang, L., Liu, C., Song, X., He, S., Zhai, H., Liu, Q., 2014. An *Ipomoea batatas* iron-sulfur cluster scaffold protein gene, *IbNFU1*, is involved in salt tolerance. *PLoS One*, 9, e93935.
23. **Liu, D.**, Wang, L., Zhai, H., Song, X., He, S., Liu, Q., 2014. A novel  $\alpha/\beta$ -hydrolase gene *IbMas* enhances salt tolerance in transgenic sweetpotato. *PLoS One*, 9, e115128.
24. Wang, L., He, S., Zhai, H., **Liu, D.**, Wang, Y., Liu, Q., 2013. Molecular cloning and functional characterization of a salt tolerance-associated gene *IbNFU1* from sweetpotato. *Journal of Integrative Agriculture*, 12, 27-35.
25. Chen, W., Zhai H., Yang, Y., He, S., **Liu, D.**, Liu, Q., 2013. Identification of differentially expressed genes in sweetpotato storage roots between Kokei No. 14 and its mutant Nongdafu 14 using PCR-based cDNA subtraction. *Journal of Integrative Agriculture*, 12, 589-595.
26. Wang, L., Dai, C., **Liu, D.**, Liu, Q., 2012. Identification of a male-specific amplified fragment length polymorphism (AFLP) marker in *Broussonetia papyrifera*. *African Journal of Biotechnology*, 1, 8196-8201.
27. **Liu, D.**, Zhao, N., Zhai, H., Yu, X., Jie, Q., Wang, L., He, S., Liu, Q., 2012. AFLP fingerprinting and genetic diversity of main sweetpotato varieties in China. *Journal of Integrative Agriculture*, 11, 424-443.

## Conferences

1. Title: Heritable base-editing in plants using viral delivery  
 Conference: 3<sup>rd</sup> International Conference on Base Editing – Enzymes and Applications Deaminet, Jan. 23-25, 2022  
 Authors: **Degao Liu**, Shuya Xuan, Lynn Prichard, Lilee Donahue, Evan E. Ellison, Colby Starker, Daniel F. Voytas
2. Title: CRISPR/Cas9-mediated genome editing for photosynthesis research (Invited oral presentation)  
 Conference: Plant and Animal Genome XXVIII Conference, Jan. 11-15, 2020, San Diego, CA  
 Authors: **Degao Liu**, Colby Starker, Gerald A. Tuskan, Xiaohan Yang, and Daniel F. Voytas
3. Title: Engineering photosynthesis to improve yield and water-use efficiency in C<sub>3</sub> plants (poster)  
 Conference: ASPB Plant Synthetic Biology, Aug. 7-9, 2019, San Jose, CA  
 Authors: **Degao Liu**, Colby Starker, and Daniel F. Voytas
4. Title: Expanding the capabilities for plant genome-editing and synthetic biology (Oral presentation)

Conference: The XXVII Plant and Animal Genome Conference. Jan. 12–16, 2019 San Diego, CA  
Authors: **Liu, D.**, De Paoli, H., Cheng, H., Mendoza, B., Li, L., Hu, R., Chen, M., Trinh, C.,  
Tuskan, GA., Yang, X.

5. Title: A CRISPR/Cas9 toolbox for multiplex targeted mutagenesis and precise base editing in plants (poster)  
Conference: Annual conference of the Center for Bioenergy Innovation (2018)  
Authors: **Liu, D.**, Chen, M., Hu, R., Mendoza, B., Tuskan, GA., Trinh, C., and Yang, X.
6. Title: Molecular signatures of convergent evolution in crassulacean acid metabolism (CAM) plants (Oral presentation)  
  
Conference: The XIX International Botanical Congress. Jul. 23, 2017 – Aug. 29, 2017 Shenzhen China  
Authors: Yang, X., Hu, R., Yin, H., Jenkins, J., Shu, S., Tang, H., **Liu, D.**, Weighill, D., Yim, W., Heyduk, K., Guo, HB., Moseley, R., Hartwell, J., Borland, AM., Jacobson, D., Ming, R., Leebens-Mack, J., Cushman, J., Schmutz, J., Tuskan, GA.
7. Title: Establishment of optogenetics capabilities for manipulation of gene expression in plants (poster)  
  
Conference: Annual Plant Biology meeting 2017. Jun. 24, 2017 – Jun. 28, 2017 HONULULU, Hawaii  
Authors: **Liu, D.**, Hu, R., Tuskan, GA., Yang, X.
8. Title: Synthesizing genetic circuits for regulation of the stomatal behavior in tobacco and Arabidopsis (poster)  
  
Conference: International conference of CROPS 2017 Jun. 05, 2017 – Jun. 08, 2017 Huntsville, Alabama  
Authors: **Liu, D.**, Hu, R., Tuskan, GA., Yang, X.
9. Title: Functional characterization of *phosphoenolpyruvate carboxylase* (PEPC) genes involved in crassulacean acid metabolism (CAM) in *Kalanchoë fedtschenkoi* (poster)  
  
Conference: Plant Biology 2017 (ASPB) Jun. 23, 2017 – Jun. 28, 2017 Honolulu, Hawaii  
Authors: Hu R., **Liu, D.**, Tuskan, GA., Yang, X.
10. Title: Engineering of crassulacean acid metabolism (CAM) gene modules from *Kalanchoë fedtschenkoi* into *Arabidopsis* and *Populus* to improve water-use efficiency (poster)  
  
Conference: CROPS 2017 Jun. 05, 2017 – Jun. 08, 2017 Huntsville, Alabama  
Authors: Hu, R., **Liu, D.**, Tuskan, GA., Yang, X.
11. Title: Functional characterization of *Kalanchoë* genes involved in crassulacean acid metabolism (poster)  
  
Conference: Plant and Animal Genome XXV Conference Jan. 13, 2017 – Jan. 18, 2017 San Diego, California  
Authors: Hu, R., **Liu, D.**, Tuskan, GA., Yang, X.
12. Title: Regulation of stomatal movement using synthetic biology approach (poster)

Conference: International Conference on Plant Synthetic Biology and Bioengineering Dec. 16, 2016 – Dec. 18, 2016 Miami Beach, Florida

Authors: **Liu, D.**, Hu, R., Borland, AM., Tuskan, GA., Yang, X.

13. Title: Engineering of crassulacean acid metabolism (CAM) modules into C<sub>3</sub> species via synthetic biology approach (poster)

Conference: International Conference on Plant Synthetic Biology and Bioengineering Dec. 16, 2016 – Dec. 18, 2016 Miami Beach, Florida

Authors: Hu, R., **Liu, D.**, Borland, A., Tuskan, GA., Yang, X.

14. Title: *Agave* and *Kalanchoe* omics for synthetic biology to enhance water use efficiency and drought tolerance in plants (Oral presentation)

Conference: International Conference on Plant Synthetic Biology and Bioengineering Dec. 16, 2016 - Dec. 18, 2016 Miami Beach, Florida

Authors: Yang, X., Hu, R., Yin, H., **Liu, D.**, Schmutz, J., Jenkins, J., Shu, S., Goodstein, D., Abraham, P., Hettich, R., Cushman, J., Borland, AM., Tschaplinski, TJ., Tuskan, GA.

15. Title: Leveraging *Agave* and *Kalanchoë* genomics resources to transfer crassulacean acid metabolism (CAM) modules into C<sub>3</sub> species using synthetic biology approaches (poster)

Conference: Genomic Sciences Program Annual Principal Investigator (PI) Meeting Feb. 05, 2017 – Feb. 08, 2017 Arlington, Virginia

Authors: Yang, X., Hu, R., **Liu, D.**, De Paoli, H., Abraham, P., Cushman, J., Borland, AM., Tuskan, GA.