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Education and Training

- 2006 – 2008 Oak Ridge National Laboratory (ORNL), Postdoc in *Populus* genomics
- 2005 – 2006 University of Tennessee, Postdoc in *Populus* genomics
- 2002 – 2005 Cornell University, Postdoc in molecular genetics of Arabidopsis
- 2003 Cornell University, Ph.D. Floriculture & Ornamental Horticulture/Plant Molecular Biology/Plant Breeding
- 1989 Huazhong Agricultural University, China M.S.
- 1986 Huazhong Agricultural University, China B.Sc. Forest Science

Research and Professional Experience

- 2017 – present Joint Faculty, Department of Plant Sciences, University of Tennessee, Knoxville
- 2017 – present Senior Staff Scientist, Biosciences Division, Oak Ridge National Laboratory
- 2015 – present Faculty Member, Bredesen Center for Interdisciplinary Research and Graduate Education, University of Tennessee, Knoxville
- 2014 – present Joint Faculty, Graduate School of Genome Science and Technology (GST), University of Tennessee, Knoxville
- 2012 – present Joint Faculty, Department of Biochemistry & Cellular and Molecular Biology, University of Tennessee, Knoxville
- 2011 – 2016 Staff Scientist, Biosciences Division, Oak Ridge National Laboratory
- 2009 – 2017 Adjunct Faculty, Department of Plant Sciences, University of Tennessee, Knoxville
- 2008 – 2011 Associate Staff Scientist, Biosciences Division, Oak Ridge National Laboratory
- 1989 – 1997 Assistant Research Scientist, Chinese Academy of Agricultural Sciences, Beijing, China.

Honors and Awards

- 2018 The R&D 100 Award (TNT Cloning System)
- 2008 Distinguished Achievement Award for Post-Graduate Research in Environmental Science (In recognition of outstanding early career productivity, ability to collaborate effectively in a team setting, and ability to integrate bioinformatics and molecular biology to gain novel insights into evolutionary genomics).
- 2000 Liu Memorial Award in recognition of his excellent progress and high potential for a successful academic career.
- 1995 Israeli Foreign Ministry Fellowship for training at the Volcani Center.

Other Professional Activities

Expert panel

- Research Foundation – Flanders (FWO), a Belgian public research council, based in Brussels (January 1, 2021 -).

Proposal review

- US National Science Foundation (NSF) review panel.
- Reviewer for USDA National Research Initiative Competitive Grants Program, Biotechnology and Biological Sciences Research Council (BBSRC), Research Foundation – Flanders (FWO), and USDA Internal Project.

Manuscript review

- Reviewer for Biotechnology Progress, BMC Bioinformatics, BMC Biotechnology, Critical Reviews in Plant Sciences, Environmental Management, International Journal of Plant Genomics, Journal of Experimental Botany, Journal of Plant Biotechnology, Journal of Proteomic Research, Nature Biotechnology, Nature Plants, New Phytologist, Physiologia Plantarum, Planta, Plant Methods, Plos Computational Biology

Membership

- Member of American Association for the Advancement of Science (2018 - present)

Service

- Joint convener of the 1st International BioDesign Research Conference (<http://www.biodesign-conference.com/>)
- Organizer of the 34th New Phytologist Symposium: Systems biology and ecology of CAM plants. Tahoe City, CA, USA, 15–18 July 2014. (<http://www.newphytologist.org/symposiums/view/5>)
- Editor-in-Chief of BioDesign Research (<https://spj.sciencemag.org/bdr/>) (2019 - present)
- Editorial Board of Scientific Reports (2018 - present)
- Lead guest editor for Special Issue "Genetics, genomics, and evolution of CAM photosynthesis" in Genes.
- http://www.mdpi.com/journal/genes/special_issues/cam_photosynth
- Lead guest editor for Research Topic entitled "Systems Biology and Synthetic Biology in Relation to Drought Tolerance or Avoidance in Plants" in Frontiers in Plant Science. <http://journal.frontiersin.org/researchtopic/6651/systems-biology-and-synthetic-biology-in-relation-to-drought-tolerance-or-avoidance-in-plants>
- Lead guest editor for a special issue entitled "Plant Comparative and Functional Genomics". International Journal of Genomics. <http://www.hindawi.com/journals/ijg/si/825361/>
- Leader of the ORNL CAM research team, a key component of the \$14.3 million multi-institutional DOE project to engineer crassulacean acid metabolism (CAM) into C₃ plants to enhance water-use efficiency for sustainable biofuels production on marginal land.

Media Coverage

"Does Agave Hold the Secret to Drought-Resistant Farming?" (July 13, 2015)

<http://www.scientificamerican.com/article/does-agave-hold-the-secret-to-drought-resistant-farming/>

"Can genetic engineering help quench crops' thirst?" (January 4, 2016)

<http://ensia.com/features/can-genetic-engineering-help-quench-crops-thirst/>

“New study of water-saving plants advances efforts to develop drought-resistant crops” (December 5, 2016)

<https://www.ornl.gov/news/new-study-water-saving-plants-advances-efforts-develop-drought-resistant-crops>

“Small Proteins Secreted by Poplar Roots Form Communication Route with Associated Fungal Communities” (May 10, 2017)

<http://genomicscience.energy.gov/program/berhighlights.shtml>

“SimPath licenses novel ORNL system for enhanced synthetic biology” (October 16, 2017)

<https://www.ornl.gov/news/simpath-licenses-novel-ornl-system-enhanced-synthetic-biology>

“Genes found in drought-resistant plants could accelerate evolution of water-use efficient crops” (December 1, 2017)

<https://www.ornl.gov/news/genes-found-drought-resistant-plants-could-accelerate-evolution-water-use-efficient-crops>

“Researchers Discover Genes That Make Plants Drought-Resistant” (June 21, 2018)

<https://www.rdmag.com/article/2018/06/researchers-discover-genes-make-plants-drought-resistant>

<https://www.rdmag.com/article/2018/07/r-d-special-focus-plant-science>

“Genome Insider Episode 8: A Plantiful Future” (October 13, 2020)

<https://jgi.doe.gov/genome-insider-episode-8-plantiful-future-xiaohan-yang-ornl/>

“Single gene boosts climate resilience, yield and carbon capture in crops” (June 3, 2021)

<https://www.ornl.gov/news/single-gene-boosts-climate-resilience-yield-and-carbon-capture-crops>

Invention

Patent

- US Patent No.: 10,017,770 B2 (Issued: July 10, 2018) “TNT Cloning System”. Inventors: Tuskan GA, Yang X, De Paoli HC.
- U.S. patent No. US 10,227,601 B2 (Issued: March 12, 2019): “PtDUF266 Gene Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*”. Inventors: Jin-Gui Chen, Sara Jawdy, Xiaohan Yang, Gerald A. Tuskan, Yongil Yang, Lee E. Gunter
- U.S. patent No. US 10,246,719 B2 (Issued: April 2, 2019): “Modulating Laccase Enzyme to Regulate Cell Wall Biosynthesis and Recalcitrance in Plants”. Inventors: Jin-Gui Chen, Lee E. Gunter, Sara S. Jawdy, Xiaohan Yang, Gerald A. Tuskan, Anthony C. Bryan
- U.S. patent No. US 11,028,404 B2 (Issued: June 8, 2021): “Methods of improving mycorrhization in plants and genetically modified plants with improved mycorrhization”. Inventors: Wellington Muchero, Jessy L Labbe, Lee E Gunter, Jin-Gui Chen, Sara S Jawdy, Xiaohan Yang, Gerald A Tuskan, Juan Wang, Olaf Czarnecki, Priya Ranjan
- U.S. patent No. US 11,041,164 B2 (Issued: June 22, 2021): “Genes for enhancing drought and heat tolerance in plants and methods of use”. Inventors: Xiaohan Yang, Gerald A. Tuskan, Degao Liu, Rongbin Hu, Jin-Gui Chen, Meng Xie

Pending patent

- Xiaohan Yang, Degao Liu, Rongbin Hu, Gerald A Tuskan. “Genes for enhancing salt and drought tolerance in plants and methods of use”. Application number 16774552. Publication date 2020/7/30.

Invention disclosures

- Invention Disclosure 201403422, DOE S-138,049, “A PtDUF231 Gene Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*”. (elected for patent application)
- Invention Disclosure 201403416 DOE S-138,043, “A Laccase Enzyme Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*”.
- Invention Disclosure 201403419, DOE S-138,046, “PtCAD2359 Knockdown Affects the Lignin Biosynthetic Pathway in *Populus*”.
- Invention Disclosure 201403421, DOE S-138,048, “A PtVND6 Gene Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*.”
- Invention Disclosure 201403424, DOE S-138,051, “A Prolyl 4-Hydroxylase Alpha Subunit Enzyme Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*”.
- Invention Disclosure 201403434, DOE S-138,061, “A Serine Hydroxymethyltransferase Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*”.
- Invention Disclosure 201403435, DOE S-138,062, “A Prefoldin-Like Protein Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*”.
- Invention disclosure 201804142 “Gene for enhancing photosynthetic performance and biomass production in plants”

Invited Talk

- “Challenges and opportunities in the application of biosystems design in plants” at the 1st International BioDesign Research Conference. December 16, 2020
- “Biosystems design: the future promise of plant science” at the 7th International Horticulture Research Conference (<http://www.hortres-conference.org/>). July 1, 2020. (Plenary talk)
- “Comparative genomics analysis of drought response between CAM and C₃ photosynthesis plants” International Plant & Animal Genome XXVIII; January 11- 15, 2020, San Diego, CA
- “Can Poplar Plants Use Mobile Protein Signals to Influence Mycorrhizal Fungi?” International Plant & Animal Genome XXVIII; January 11- 15, 2020, San Diego, CA
- “Application of Genome-Editing in Crassulacean Acid Metabolism (CAM) Plants” aBIOTECH board meeting and the First aBIOTECH International Conference. June 13 – 14, 2019. Beijing, China
- “Expanding the Capabilities for Plant Genome-Editing and Synthetic Biology”. International Plant & Animal Genome XXVII; January 12-16, 2019, San Diego, CA
- “Plant Systems Biology and Biotechnology in Relation to Crassulacean Acid Metabolism”. October 18, 2018, Morgan State University in Baltimore, Maryland
- “Implementation of drought avoidance mechanisms for sustainable crop production”. July 20-24, 2018. The Fifth International Horticulture Research Conference. Beijing, China.
- “An integrative approach to understanding the function of crassulacean acid metabolism (CAM)-related genes in *Agave* and *Kalanchoe*”. April 9-13, 2018. An international symposium entitled “Biology of CAM Plants”. Phoenix, Arizona, USA

- “Unravelling the Molecular Basis of Plant Water-use Efficiency and Plant-microbe Symbiosis”. February 16, 2018. Clemson University.
- “Molecular signatures of crassulacean acid metabolism”. July 23-29, 2017. The XIX International Botanical Congress (IBC2017). Shenzhen, China.
- “Toolbox for plant synthetic biology”. February 16-17, 2017. BBSRC-funded Global Challenges Research Fund (GCRF) Workshop titled “Exploring synthetic biology for enhanced plant production”, University of Liverpool, UK
- “Systems Biology and Synthetic Biology of Crassulacean Acid Metabolism”. April 13, 2016. BCMB 615 Seminar Series, University of Tennessee, Knoxville, TN
- “Comparative Evolution of Crassulacean Acid Metabolism (CAM)”. The Plant and Animal Genome Conference; January 2016 in San Diego, CA.
- “Discovery of effector-like proteins in *Populus* during symbiosis formation”. IUFRO Tree Biotechnology Conference. 8-12 June 2015, Florence, Italy.
- “Genome-wide discovery of non-coding RNAs in willow (*Salix purpurea*)”. The Plant and Animal Genome Conference XXIII. 10-14 January 2015, San Diego, CA, USA.
- “Comparative genomics of CAM plants” The 34th New Phytologist Symposium: Systems biology and ecology of CAM plants; Tahoe City, CA, USA 15–18 July 2014
- “Comparative genomics of CAM species” The Plant and Animal Genome XXII Conference; January 11-15, 2014 in San Diego, CA
- “*Agave* genomics in support of CAM engineering”. International Symposium on C₄ and CAM Plant Biology (August 6-9, 2013, Champaign, IL).

Publications (116 in total)

1. G. Yuan, H. Lu, D. Tang, M. M. Hassan, Y. Li, J.-G. Chen, G. A. Tuskan, X. Yang, Expanding the application of a UV-visible reporter for transient gene expression and stable transformation in plants. *Horticulture Research* **8**, 234 (2021).
2. G. Yuan, M. M. Hassan, T. Yao, H. Lu, M. M. Vergara, J. L. Labbé, W. Muchero, C. Pan, J.-G. Chen, G. A. Tuskan, Y. Qi, P. E. Abraham, X. Yang, Plant-based biosensors for detecting CRISPR-mediated genome engineering. *ACS Synthetic Biology*, <https://doi.org/10.1021/acssynbio.1021c00455> (2021).
3. X. Yang, D. Liu, H. Lu, D. J. Weston, J.-G. Chen, W. Muchero, S. Martin, Y. Liu, M. M. Hassan, G. Yuan, U. C. Kalluri, T. J. Tschaplinski, J. C. Mitchell, S. D. Wullschleger, G. A. Tuskan, Biological parts for plant biodesign to enhance land-based carbon dioxide removal. *BioDesign Research* **2021**, 9798714 (2021).
4. F. Tian, X.-L. Hu, T. Yao, X. Yang, J.-G. Chen, M.-Z. Lu, J. Zhang, Recent Advances in the Roles of HSFs and HSPs in Heat Stress Response in Woody Plants. *Frontiers in Plant Science* **12**, 1319 (2021).
5. H. K. Shrestha, M. I. V. Solis, S. S. Jawdy, G. A. Tuskan, X. Yang, P. E. Abraham, Temporal dynamics of protein and post-translational modification abundances in *Populus* leaf across a diurnal period. *PROTEOMICS* **21**, 2100127 (2021).
6. R. C. Moseley, F. Motta, G. A. Tuskan, S. B. Haase, X. Yang, Inference of Gene Regulatory Network Uncovers the Linkage between Circadian Clock and Crassulacean Acid Metabolism in *Kalanchoë fedtschenkoi*. *Cells* **10**, 2217 (2021).
7. D. Liu, R. Hu, J. Zhang, H.-B. Guo, H. Cheng, L. Li, A. M. Borland, H. Qin, J.-G. Chen, W. Muchero, G. A. Tuskan, X. Yang, Overexpression of an *Agave* phosphoenolpyruvate carboxylase improves plant growth and stress tolerance. *Cells* **10**, 582 (2021).

8. Z. Hu, Z. Nie, C. Yan, H. Huang, X. Ma, Y. Wang, N. Ye, G. A. Tuskan, X. Yang, H. Yin, Transcriptome and degradome profiling reveals a role of miR530 in the circadian regulation of gene expression in *Kalanchoë marnieriana*. *Cells* **10**, 1526 (2021).
9. X.-L. Hu, H. Lu, M. M. Hassan, J. Zhang, G. Yuan, P. E. Abraham, H. K. Shrestha, M. I. Villalobos Solis, J.-G. Chen, T. J. Tschaplinski, M. J. Doktycz, G. A. Tuskan, Z.-M. Cheng, X. Yang, Advances and perspectives in discovery and functional analysis of small secreted proteins in plants. *Horticulture Research* **8**, 130 (2021).
10. M. M. Hassan, Y. Zhang, G. Yuan, K. De, J.-G. Chen, W. Muchero, G. A. Tuskan, Y. Qi, X. Yang, Construct design for CRISPR/Cas-based genome editing in plants. *Trends in Plant Science* **26**, 1133-1152 (2021).
11. J. Zhang, M. Xie, M. Li, J. Ding, Y. Pu, A. C. Bryan, W. Rottmann, K. A. Winkeler, C. M. Collins, V. Singan, E. A. Lindquist, S. S. Jawdy, L. E. Gunter, N. L. Engle, X. Yang, K. Barry, T. J. Tschaplinski, J. Schmutz, G. A. Tuskan, W. Muchero, J.-G. Chen, Overexpression of a Prefoldin β subunit gene reduces biomass recalcitrance in the bioenergy crop *Populus*. *Plant Biotechnology Journal* **18**, 859-871 (2020).
12. J. Zhang, R. Hu, A. Sreedasyam, T. M. Garcia, A. Lipzen, M. Wang, P. Yerramsetty, D. Liu, V. Ng, J. Schmutz, J. C. Cushman, A. M. Borland, A. Pasha, N. J. Provart, J.-G. Chen, W. Muchero, G. A. Tuskan, X. Yang, Light-responsive expression atlas reveals the effects of light quality and intensity in *Kalanchoë fedtschenkoi*, a plant with crassulacean acid metabolism. *GigaScience* **9**, giaa018, <https://doi.org/010.1093/gigascience/giaa1018> (2020).
13. G. Yuan, M. M. Hassan, D. Liu, S. D. Lim, W. C. Yim, J. C. Cushman, K. Markel, P. M. Shih, H. Lu, D. J. Weston, J.-G. Chen, T. J. Tschaplinski, G. A. Tuskan, X. Yang, Biosystems design to accelerate C_3 -to-CAM progression. *BioDesign Research* **2020**, 3686791 (2020).
14. X. Yang, J. I. Medford, K. Markel, P. M. Shih, H. C. De Paoli, C. T. Trinh, A. J. McCormick, R. Ployet, S. G. Hussey, A. A. Myburg, P. E. Jensen, M. M. Hassan, J. Zhang, W. Muchero, U. C. Kalluri, H. Yin, R. Zhuo, P. E. Abraham, J.-G. Chen, D. J. Weston, Y. Yang, D. Liu, Y. Li, J. Labbe, B. Yang, J. H. Lee, R. W. Cottingham, S. Martin, M. Lu, T. J. Tschaplinski, G. Yuan, H. Lu, P. Ranjan, J. C. Mitchell, S. D. Wullschleger, G. A. Tuskan, Plant biosystems design research roadmap 1.0. *BioDesign Research* **2020**, 8051764 (2020).
15. X. Yang, J. C. Cushman, A. M. Borland, Q. Liu, Editorial: Systems biology and synthetic biology in relation to drought tolerance or avoidance in plants. *Frontiers in Plant Science* **11**, <https://doi.org/10.3389/fpls.2020.00394> (2020).
16. H. Lu, G. Yuan, S. H. Strauss, T. J. Tschaplinski, G. A. Tuskan, J.-G. Chen, X. Yang, Reconfiguring plant metabolism for biodegradable plastic production. *BioDesign Research* **2020**, Article ID 9078303 (2020).
17. U. C. Kalluri, X. Yang, S. D. Wullschleger, Plant biosystems design for a carbon-neutral bioeconomy. *BioDesign Research* **2020**, Article ID 7914051, <https://doi.org/7914010.7934133/7912020/7914051> (2020).
18. M. M. Hassan, G. Yuan, J.-G. Chen, G. A. Tuskan, X. Yang, Prime editing technology and its prospects for future applications in plant biology research. *BioDesign Research* **2020**, Article ID 9350905 (2020).
19. C. DeLisi, A. Patrinos, M. MacCracken, D. Drell, G. Annas, A. Arkin, G. Church, R. Cook-Deegan, H. Jacoby, M. Lidstrom, J. Melillo, R. Milo, K. Paustian, J. Reilly, R. Roberts, D. Segrè, S. Solomon, D. Woolf, S. D. Wullschleger, X. Yang, The role of synthetic biology in atmospheric greenhouse gas reduction: Prospects and challenges. *BioDesign Research*, Article ID 1016207 (2020).

20. J. Zhang, M. Li, A. C. Bryan, C. G. Yoo, W. Rottmann, K. A. Winkeler, Cassandra M. Collins, V. Singan, E. A. Lindquist, S. S. Jawdy, L. E. Gunter, N. L. Engle, X. Yang, K. Barry, T. J. Tschaplinski, J. Schmutz, Y. Pu, A. J. Ragauskas, G. A. Tuskan, W. Muchero, J.-G. Chen, Overexpression of a serine hydroxymethyltransferase increases biomass production and reduces recalcitrance in the bioenergy crop *Populus*. *Sustainable Energy & Fuels* **3**, 195-207 (2019).
21. Y. Yang, C. G. Yoo, W. Rottmann, K. A. Winkeler, C. M. Collins, L. E. Gunter, S. S. Jawdy, X. Yang, Y. Pu, A. J. Ragauskas, G. A. Tuskan, J.-G. Chen, PdWND3A, a wood-associated NAC domain-containing protein, affects lignin biosynthesis and composition in *Populus*. *BMC Plant Biology* **19**, 486 (2019).
22. X. Yang, L. S. Qi, A. Jaramillo, Z.-M. Cheng, Biodesign research to advance the principles and applications of biosystems design. *BioDesign Research* **2019**, Article ID 9680853 (2019).
23. X. Yang, D. Liu, T. J. Tschaplinski, G. A. Tuskan, Comparative genomics can provide new insights into the evolutionary mechanisms and gene function in CAM plants. *Journal of Experimental Botany*, <https://doi.org/10.1093/jxb/erz408>, (2019).
24. X. Wang, X. Chen, Q. Cheng, K. Zhu, X. Yang, Z. Cheng, *Agrobacterium*-mediated transformation of *Kalanchoe laxiflora*. *Horticultural Plant Journal* **5**, 221-228 (2019).
25. T. J. Tschaplinski, P. E. Abraham, S. S. Jawdy, L. E. Gunter, M. Z. Martin, N. L. Engle, X. Yang, G. A. Tuskan, The nature of the progression of drought stress drives differential metabolomic responses in *Populus deltoides*. *Annals of Botany*, *mcz002*, <https://doi.org/10.1093/aob/mcz002>, (2019).
26. R. C. Moseley, G. A. Tuskan, X. Yang, Comparative genomics analysis provides new insight into molecular basis of stomatal movement in *Kalanchoë fedtschenkoi*. *Frontiers in Plant Science*, <https://doi.org/10.3389/fpls.2019.00292>, (2019).
27. R. Mewalal, H. Yin, R. Hu, S. S. Jawdy, P. Vion, G. A. Tuskan, F. L. Tacon, J. L. Labbé, X. Yang, Identification of *Populus* small RNAs responsive to mutualistic interactions with mycorrhizal fungi, *Laccaria bicolor* and *Rhizophagus irregularis*. *Frontiers in Microbiology*, doi: 10.3389/fmicb.2019.00515 (2019).
28. D. Liu, M. Chen, B. Mendoza, H. Cheng, R. Hu, L. Li, C. T. Trinh, G. A. Tuskan, X. Yang, CRISPR/Cas9-mediated targeted mutagenesis for functional genomics research of crassulacean acid metabolism plants. *Journal of Experimental Botany* **70**, 6621-6629 (2019).
29. J. Labbé, W. Muchero, O. Czarnecki, J. Wang, X. Wang, A. C. Bryan, K. Zheng, Y. Yang, M. Xie, J. Zhang, D. Wang, P. Meidl, H. Wang, J. L. Morrell-Falvey, K. R. Cope, L. G. S. Maia, J.-M. Ané, R. Mewalal, S. S. Jawdy, L. E. Gunter, W. Schackwitz, J. Martin, F. Le Tacon, T. Li, Z. Zhang, P. Ranjan, E. Lindquist, X. Yang, D. A. Jacobson, T. J. Tschaplinski, K. Barry, J. Schmutz, J.-G. Chen, G. A. Tuskan, Mediation of plant-mycorrhizal interaction by a lectin receptor-like kinase. *Nature Plants* **5**, 676-680 (2019).
30. H.-B. Guo, Y. Ma, G. A. Tuskan, H. Qin, X. Yang, H. Guo, A suggestion of converting protein intrinsic disorder to structural entropy using shannon's information theory. *Entropy* **21**, 591 (2019).
31. H. B. Chhetri, D. Macaya-Sanz, D. Kainer, A. K. Biswal, L. M. Evans, J.-G. Chen, C. Collins, K. Hunt, S. S. Mohanty, T. Rosenstiel, D. Ryno, K. Winkeler, X. Yang, D. Jacobson, D. Mohnen, W. Muchero, S. H. Strauss, T. J. Tschaplinski, G. A. Tuskan, S. P. DiFazio, Multitrait genome-wide association analysis of *Populus trichocarpa* identifies key polymorphisms controlling morphological and physiological traits. *New Phytologist* **223**, 293-309 (2019).

32. H. Yin, H.-B. Guo, D. J. Weston, A. M. Borland, P. Ranjan, P. E. Abraham, S. S. Jawdy, J. Wachira, G. A. Tuskan, T. J. Tschaplinski, S. D. Wullschleger, H. Guo, R. L. Hettich, S. M. Gross, Z. Wang, A. Visel, X. Yang, Diel rewiring and positive selection of ancient plant proteins enabled evolution of CAM photosynthesis in Agave. *BMC Genomics* **19**, 588 (2018).
33. R. C. Moseley, R. Mewalal, F. Motta, G. A. Tuskan, S. Haase, X. Yang, Conservation and diversification of circadian rhythmicity between a model crassulacean acid metabolism plant *Kalanchoë fedtschenkoi* and a model C₃ photosynthesis plant *Arabidopsis thaliana*. *Frontiers in Plant Science* **9**, 1757 (2018).
34. D. Liu, K. J. Palla, R. Hu, R. C. Moseley, C. Mendoza, M. Chen, P. E. Abraham, J. L. Labbé, U. C. Kalluri, T. J. Tschaplinski, J. C. Cushman, A. M. Borland, G. A. Tuskan, X. Yang, Perspectives on the basic and applied aspects of crassulacean acid metabolism (CAM) research. *Plant Science* **274**, 394-401 (2018).
35. S. D. Lim, W. C. Yim, D. Liu, R. Hu, X. Yang, J. C. Cushman, A *Vitis vinifera* basic helix–loop–helix transcription factor enhances plant cell size, vegetative biomass and reproductive yield. *Plant Biotechnology Journal* **16**, 1595-1615 (2018).
36. H.-B. Guo, Y. Ma, G. A. Tuskan, X. Yang, H. Guo, Classification of complete proteomes of different organisms and protein sets based on their protein distributions in terms of some key attributes of proteins. *International Journal of Genomics* **2018**, Article ID 9784161. <https://doi.org/9784110.9781155/9782018/9784161> (2018).
37. B. J. Garcia, J. Labbe, P. Jones, P. Abraham, I. Hodge, S. Climer, S. Jawdy, L. Gunter, G. A. Tuskan, X. Yang, T. J. Tschaplinski, D. Jacobson, Phytobiome and transcriptional adaptation of *Populus deltoides* to acute progressive drought and cyclic drought. *Phytobiomes*, <https://doi.org/10.1094/PBIOMES-1004-1018-0021-R> (2018).
38. A. M. Borland, A. Leverett, N. Hurtado-Castano, R. Hu, X. Yang, in *The Leaf: A Platform for Performing Photosynthesis*, W. W. Adams III, I. Terashima, Eds. (Springer International Publishing AG, Cham, Switzerland, 2018), pp. 281-305.
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