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https://scholar.google.com/citations?user=DYH7aqAAAAAJ&hl=en

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., Ornamental Botany
1986	Huazhong Agricultural University, China B.Sc., Forest Science

Research and Professional Experience

2023 – present	Distinguished Scientist, Biosciences Division, Oak Ridge National Laboratory
2017 – 2023	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
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

2022	The first prize of Cells 2021 Best Paper Awards for Anniversary Special Issues (https://www.mdpi.com/journal/cells/awards/1113)
2018	The R&D 100 Award
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 - present).

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 ACS Synthetic Biology, 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, Phyiologia Plantarum, Planta, Plant Methods, Plos Computational Biology

Membership

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

Service

- Editor-in-Chief of BioDesign Research (https://spj.sciencemag.org/bdr/) (2019 - present)
- Joint convener of the 1st International BioDesign Research Conference (https://www.biodesign-conference.com/2020/)
- Joint convener of 2nd International BioDesign Research Conference (https://www.biodesign-conference.com/2021/)
- Joint convener of the 3rd International BioDesign Research Conference (https://www.confrxiv.com/IBDRC2022/)
- Joint convener of the 4th International BioDesign Research Conference (October 27th - 30th, 2023; https://www.biodesign-conference.com/)
- Co-organizer of the "Genome Biodesign in Plants and Animals" session at the Plant & Animal Genome Conference: PAG 30 (https://www.intlpag.org/30/) and PAG 31 (https://www.intlpag.org/31/)
- 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)
- Editorial Board of Scientific Reports (2018 - 2021)
- Editorial Board of Plants (2019 - present)
- Editorial Board of aBIOTECH (2022 - 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 C_3 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

"Watching Plants Switch on Genes" (October 7, 2022)
https://www.energy.gov/science/ber/articles/watching-plants-switch-genes

"Agave gene delays poplar dormancy" (January 17, 2023)
https://www.ornl.gov/news/agave-gene-delays-poplar-dormancy

"Transforming plants into allies in the fight against climate change" (May 23, 2023)
https://www.ornl.gov/news/transforming-plants-allies-fight-against-climate-change

"New approach 'stacks' genes for faster plant transformation" (June 8, 2023)
https://www.ornl.gov/news/new-approach-stacks-genes-faster-plant-transformation

"Q&A with Xiaohan Yang: Transforming plants for a cleaner future" (September 22, 2023) https://www.ornl.gov/news/qa-xiaohan-yang-transforming-plants-cleaner-future

Invention

Patent

1) 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
2) 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
3) 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
4) 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
5) U.S. patent No. US 11,535,860 B2 (Issued: December 27, 2022) "Genes for enhancing salt and drought tolerance in plants and methods of use". Inventors: Xiaohan Yang, Degao Liu, Rongbin Hu, Gerald A. Tuskan.
6) U.S. patent No. US 11,715,191 B2 (Issued: August 1, 2023) "Method and system for automated plant surveillance and manipulation". Inventors: Udaya C. Kalluri, Andrzej Nycz, Lonnie J. Love, Vincent C. Paquit, Xiaohan Yang, Samuel C. Leach, Harold Walters
7) US Patent No.: 11,725,211 B2 (Issued: August 15, 2023) "TNT Cloning System". Inventors: Gerald A. Tuskan, Xiaohan Yang, Henrique Cestari De Paoli.

Pending patent

1) Yang X, Liu D, Li Y, Tuskan GA "Year-Round Plant Growth in Warm Conditions" US Provisional Patent App. 63/331,899 (Filed date: April 18, 2022).
2) Yang X, Yuan G, Martin S, Hassan MD, Tuskan GA. "Rapid Assembly of gRNA Arrays" US Provisional Application No. 63/345,460 (Filed date: May 25, 2022)
3) Yang X, Yuan G, Lu H, Hassan MD, Tuskan GA. "Split Selectable Marker Mediated Gene Stacking" US Provisional Application No. 63/408,485 (Filed date: September 21, 2022)

Invention disclosures

1) Invention Disclosure 201403422, DOE S-138,049, "A PtDUF231 Gene Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*". (elected for patent application)
2) Invention Disclosure 201403416 DOE S-138,043, "A Laccase Enzyme Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*".
3) Invention Disclosure 201403419, DOE S-138,046, "PtCAD2359 Knockdown Affects the Lignin Biosynthetic Pathway in *Populus*".
4) Invention Disclosure 201403421, DOE S-138,048, "A PtVND6 Gene Regulating Cell Wall Biosynthesis and Recalcitrance in *Populus*."
5) Invention Disclosure 201403424, DOE S-138,051, "A Prolyl 4-Hydroxylase Alpha Subunit Enzyme Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*".
6) Invention Disclosure 201403434, DOE S-138,061, "A Serine Hydroxymethyltransferase Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*".

7) Invention Disclosure 201403435, DOE S-138,062, “A Prefoldin-Like Protein Regulates Cell Wall Biosynthesis and Recalcitrance in *Populus*".
8) Invention disclosure 201804142 “Gene for enhancing photosynthetic performance and biomass production in plants”

Invited Talks

1) “Developing synthetic biology tools for plant genetic engineering and safe plant biodesign”. New Phytologist Workshop: introducing Transformative Plant Biotechnology. September 20–22, 2023, Edinburgh, UK
2) “Genomics of CAM plants: *Kalanchoe* gene atlas and the genomes of *Kalanchoe* and *Agave*”. Plant & Animal Genome Conference: PAG 30 (Session: BER Plant Genomic Science); January 13-18, 2023, San Diego, CA
3) “System-level design of plant carbon pump for carbon dioxide removal and utilization on marginal lands”. DOE ARPA-E Carbon Farming Workshop, Kansas City, Missouri; June 29, 2022.
4) “How can crassulacean acid metabolism contribute to climate change mitigation?”. The Center for Precision Plant Genomics, University of Minnesota; April 22, 2022.
5) “CAM genomics and plant synthetic biology for bioenergy and ecosystem security”. Plant Biology Department, University of Illinois Urbana-Champaign; January 19, 2022.
6) “Perspectives on the application of plant synthetic biology in climate change mitigation” at the 2nd International BioDesign Research Conference. (https://www.biodesign-conference.com/2021) December 16, 2021.
7) “The potential of engineering a ‘Super Plant Carbon Pump’ for carbon dioxide removal”. Climate Change & Ag Innovation Conference, Boston; November 11, 2021.
8) “Challenges and opportunities in the application of biosystems design in plants” at the 1st International BioDesign Research Conference. (https://www.biodesign-conference.com/2020) December 16, 2020.
9) “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)
10) “Comparative genomics analysis of drought response between CAM and C_3 photosynthesis plants” International Plant & Animal Genome XXVIII; January 11- 15, 2020, San Diego, CA
11) “Can Poplar Plants Use Mobile Protein Signals to Influence Mycorrhizal Fungi?” International Plant & Animal Genome XXVIII; January 11- 15, 2020, San Diego, CA
12) “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
13) “Expanding the Capabilities for Plant Genome-Editing and Synthetic Biology”. International Plant & Animal Genome XXVII; January 12-16, 2019, San Diego, CA
14) “Plant Systems Biology and Biotechnology in Relation to Crassulacean Acid Metabolism”. October 18, 2018, Morgan State University in Baltimore, Maryland
15) “Implementation of drought avoidance mechanisms for sustainable crop production”. July 20-24, 2018. The Fifth International Horticulture Research Conference. Beijing, China.
16) “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
17) “Unravelling the Molecular Basis of Plant Water-use Efficiency and Plant-microbe Symbiosis”. February 16, 2018. Clemson University.
18) “Molecular signatures of crassulacean acid metabolism”. July 23-29, 2017. The XIX International Botanical Congress (IBC2017). Shenzhen, China.

19) "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
20) "Systems Biology and Synthetic Biology of Crassulacean Acid Metabolism". April 13, 2016. BCMB 615 Seminar Series, University of Tennessee, Knoxville, TN
21) "Comparative Evolution of Crassulacean Acid Metabolism (CAM)". The Plant and Animal Genome Conference; January 2016 in San Diego, CA.
22) "Discovery of effector-like proteins in *Populus* during symbiosis formation". IUFRO Tree Biotechnology Conference. 8-12 June 2015, Florence, Italy.
23) "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.
24) "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
25) "Comparative genomics of CAM species" The Plant and Animal Genome XXII Conference; January 11-15, 2014 in San Diego, CA
26) "*Agave* genomics in support of CAM engineering". International Symposium on C_4 and CAM Plant Biology (August 6-9, 2013, Champaign, IL).

Publications (A total of 145; "*" indicates corresponding author)

145. H. Sun, A. Kalluri, D. Tang, J. Ding, L. Zhai, X. Gu, Y. Li, H. Yer, **X. Yang**, G. A. Tuskan, Z. Deng, F. G. Gmitter Jr, H. Duan, C. Kumar, Y. Li, Engineered dsRNA-protein nanoparticles for effective systemic gene silencing in plants. *Horticulture Research*, uhae045 (2024). doi: 10.1093/hr/uhae045
144. M. T. Islam, Y. Liu, M. M. Hassan, P. E. Abraham, J. Merlet, A. Townsend, D. Jacobson, C. R. Buell, G. A. Tuskan*, **X. Yang***, Advances in the Application of Single-Cell Transcriptomics in Plant Systems and Synthetic Biology. *BioDesign Research* **6**, 0029 (2024). doi: doi:10.34133/bdr.0029
143. J. Zhang, X. Wang, H.-T. Wang, Z. Qiao, T. Yao, M. Xie, B. R. Urbanowicz, W. Zeng, S. S. Jawdy, L. E. Gunter, **X. Yang**, O. Czarnecki, S. Regan, A. Seguin, W. Rottmann, K. A. Winkeler, R. Sykes, A. Lipzen, C. Daum, K. Barry, M.-Z. Lu, G. A. Tuskan, W. Muchero, J.-G. Chen, Overexpression of REDUCED WALL ACETYLATION C increases xylan acetylation and biomass recalcitrance in Populus. *Plant Physiology* **194**, 243-257 (2023). doi: 10.1093/plphys/kiad377
142. G. Yuan, G. A. Tuskan*, **X. Yang***, Use of fluorescent protein reporters for assessing and detecting genome editing reagents and transgene expression in plants. in *Plant Genome Engineering: Methods and Protocols*, B. Yang, W. Harwood, Q. Que, Eds. (Springer US, New York, NY, 2023), pp. 115-127. doi: 10.1007/978-1-0716-3131-7_8
141. G. Yuan, H. Lu, K. De, M. M. Hassan, Y. Liu, M. T. Islam, W. Muchero, G. A. Tuskan*, **X. Yang***, Split selectable marker systems utilizing inteins facilitate gene stacking in plants. *Communications Biology* **6**, 567 (2023). doi: 10.1038/s42003-023-04950-8
140. G. Yuan, Y. Liu, T. Yao, W. Muchero, J.-G. Chen, G. A. Tuskan*, **X. Yang***, eYGFPuv-assisted transgenic selection in *Populus deltoides* WV94 and multiplex genome editing in protoplasts of *P. trichocarpa* x *P. deltoides* clone "52-225". *Plants* **12**, 1657 (2023). doi: 10.3390/plants12081657
139. T. Yao, G. Yuan, H. Lu, Y. Liu, J. Zhang, G. A. Tuskan, W. Muchero*, J.-G. Chen*, **X. Yang***, CRISPR/Cas9-based gene activation and base editing in *Populus*. *Horticulture Research* **10**, (2023). doi: 10.1093/hr/uhad085
138. **X. Yang***, Y. Liu, G. Yuan, D. J. Weston, G. A. Tuskan, Engineering crassulacean acid metabolism in C_3 and C_4 plants. in *Perspectives on Synthetic Biology and Greenhouse Gases*, D. Drell, L. V. Giddings, A. Patrinos, R. J. Roberts, C. DeLisi, Eds. (Cold Spring Harbor Laboratory Press, 2023). doi: 10.1101/cshperspect.a041674

137. A. Sreedasyam, C. Plott, M. S. Hossain, John T. Lovell, J. Grimwood, Jerry W. Jenkins, C. Daum, K. Barry, J. Carlson, S. Shu, J. Phillips, M. Amirebrahimi, M. Zane, M. Wang, D. Goodstein, Fabian B. Haas, M. Hiss, P.-F. Perroud, Sara S. Jawdy, Y. Yang, R. Hu, J. Johnson, J. Kropat, Sean D. Gallaher, A. Lipzen, Eugene V. Shakirov, X. Weng, I. Torres-Jerez, B. Weers, D. Conde, Marilia R. Pappas, L. Liu, A. Muchlinski, H. Jiang, C. Shyu, P. Huang, J. Sebastian, C. Laiben, A. Medlin, S. Carey, Alyssa A. Carrell, J.-G. Chen, M. Perales, K. Swaminathan, I. Allona, D. Grattapaglia, Elizabeth A. Cooper, D. Tholl, John P. Vogel, D. J. Weston, **X. Yang**, Thomas P. Brutnell, Elizabeth A. Kellogg, I. Baxter, M. Udvardi, Y. Tang, Todd C. Mockler, Thomas E. Juenger, J. Mullet, Stefan A. Rensing, Gerald A. Tuskan, Sabeeha S. Merchant, G. Stacey, J. Schmutz, JGI Plant Gene Atlas: an updateable transcriptome resource to improve functional gene descriptions across the plant kingdom. *Nucleic Acids Research* **51**, 8383-8401 (2023). doi: 10.1093/nar/gkad616

136. Y. Liu, G. Yuan, B. Hyden, G. A. Tuskan, P. E. Abraham*, **X. Yang***, Expanding the application of anti-CRISPR proteins in plants for tunable genome editing. *Plant Physiology* **192**, 60-64 (2023). doi: 10.1093/plphys/kiad076

135. D. Liu, D. Tang, M. Xie, J. Zhang, L. Zhai, J. Mao, C. Luo, A. Lipzen, Y. Zhang, E. Savage, G. Yuan, H.-B. Guo, D. Tadesse, R. Hu, S. Jawdy, H. Cheng, L. Li, H. Yer, M. M. Clark, H. Sun, J. Shi, R. Budhathoki, R. Kumar, T. Kamuda, Y. Li, C. Pennacchio, K. Barry, J. Schmutz, R. Berry, W. Muchero, J.-G. Chen, Y. Li, G. A. Tuskan, **X. Yang***, *Agave REVEILLE1* regulates the onset and release of seasonal dormancy in *Populus*. *Plant Physiology* **191**, 1492-1504 (2023). doi: 10.1093/plphys/kiac588

134. C. Li, W. Huang, X. Han, G. Zhao, W. Zhang, W. He, B. Nie, X. Chen, T. Zhang, W. Bai, X. Zhang, J. He, C. Zhao, A. R. Fernie, T. J. Tschaplinski, **X. Yang***, S. Yan*, L. Wang*, Diel dynamics of multi-omics in elkhorn fern provide new insights into weak CAM photosynthesis. *Plant Communications*, 100594 (2023). doi: 10.1016/j.xplc.2023.100594

133. B. Hyden, D. L. Carper, P. E. Abraham, G. Yuan, T. Yao, L. Baumgart, Y. Zhang, C. Chen, R. O'Malley, J.-G. Chen, **X. Yang**, R. L. Hettich, G. A. Tuskan, L. B. Smart, Functional analysis of *Salix purpurea* genes support roles for ARR17 and GATA15 as master regulators of sex determination. *Plant Direct* **7**, e3546 (2023). doi: https://doi.org/10.1002/pld3.546

132. M. M. Hassan, S. Martin, K. Feng, T. B. Yates, G. Yuan, M. Z. Martin, S. Martin, W. Muchero, N. A. Griffiths, D. J. Weston*, **X. Yang***, Genome-wide identification and functional prediction of silicon (Si) transporters in poplar (*Populus trichocarpa*). *Plant Biotechnology Reports* **17**, 285-302 (2023). doi: 10.1007/s11816-022-00788-4

131. E. Chang, W. Guo, J. Chen, J. Zhang, Z. Jia, T. J. Tschaplinski, **X. Yang**, Z. Jiang, J. Liu, Chromosome-level genome assembly of *Quercus variabilis* provides insights into the molecular mechanism of cork thickness. *Plant Science* **337**, 111874 (2023). doi: https://doi.org/10.1016/j.plantsci.2023.111874

130. E. G. Brooks, E. Elorriaga, Y. Liu, J. R. Duduit, G. Yuan, C.-J. Tsai, G. A. Tuskan, T. G. Ranney, **X. Yang***, W. Liu*, Plant promoters and terminators for high-precision bioengineering. *BioDesign Research* **5**, 0013 (2023). doi: 10.34133/bdr.0013

129. H. B. Andrews, A. M. Wymore, E. Wetter, E. M. Herndon, H. Li, S. A. Martin, N. A. Griffiths, **X. Yang**, W. Muchero, D. J. Weston, Rapid screening of wood and leaf tissues: investigating silicon-based phytoliths in Populus trichocarpa for carbon storage applications using laser-induced breakdown spectroscopy and scanning electron microscopy–energy dispersive X-ray spectroscopy. *Journal of Analytical Atomic Spectrometry* **38**, 2353-2364 (2023). doi: 10.1039/D3JA00186E

128. G. Yuan, S. Martin, M. M. Hassan, G. A. Tuskan*, **X. Yang***, PARA: A new platform for the rapid assembly of gRNA arrays for multiplexed CRISPR technologies. *Cells* **11**, 2467 (2022). doi: 10.3390/cells11162467
127. G. Yuan, H. Lu, D. J. Weston, S. Jawdy, T. J. Tschaplinski, G. A. Tuskan*, **X. Yang***, Reporter genes confer new-to-nature ornamental traits in plants. *Horticulture Research* **9**, uhac077 (2022). doi: 10.1093/hr/uhac077
126. G. Yuan, H. Lu, K. De, M. M. Hassan, Y. Liu, Y. Li, W. Muchero, P. E. Abraham, G. A. Tuskan*, **X. Yang***, An Intein-Mediated Split–nCas9 System for Base Editing in Plants. *ACS Synthetic Biology* **11**, 2513-2517 (2022). doi: 10.1021/acssynbio.1c00507
125. S. Tan, Y. Liang, Y. Huang, J. Xi, X. Huang*, **X. Yang***, K. Yi*, Phylogeny and expression atlas of the NITRATE TRANSPORTER 1/PEPTIDE TRANSPORTER FAMILY in *Agave*. *Plants* **11**, 1434 (2022). doi: 10.3390/plants11111434
124. R. S. Payyavula, R. Badmi, S. S. Jawdy, M. Rodriguez Jr, L. Gunter, R. W. Sykes, K. A. Winkeler, C. M. Collins, W. H. Rottmann, J.-G. Chen, **X. Yang**, G. A. Tuskan, U. C. Kalluri*, Biomass formation and sugar release efficiency of *Populus* modified by altered expression of a NAC transcription factor. *Plant Direct* **6**, e419 (2022). doi: 10.1002/pld3.419
123. Y. Liu, G. Yuan, M. M. Hassan, P. E. Abraham, J. C. Mitchell, D. Jacobson, G. A. Tuskan, A. Khakhar, J. Medford, C. Zhao, C.-J. Liu, C. A. Eckert, M. J. Doktycz, T. J. Tschaplinski, **X. Yang***, Biological and molecular components for genetically engineering biosensors in plants. *BioDesign Research* **2022**, 9863496 (2022). doi: 10.34133/2022/9863496
122. B. Hyden, G. Yuan, Y. Liu, L. B. Smart, G. A. Tuskan, **X. Yang***, Protoplast-based transient expression and gene editing in shrub willow (*Salix purpurea* L.). *Plants* **11**, 3490 (2022). doi: 10.3390/plants11243490
121. X. Huang, B. Xu, S. Tan, Y. Huang, J. Xi, X. Qin, T. Chen, H. Chen, **X. Yang***, K. Yi*, Transcriptome sequencing of *Agave angustifolia* reveals conservation and diversification in the expression of cinnamyl alcohol dehydrogenase genes in *Agave* species. *Agriculture* **12**, 1003 (2022). doi: 10.3390/agriculture12071003
120. X.-L. Hu, J. Zhang, R. Kaundal, R. Kataria, J. L. Labbé, J. C. Mitchell, T. J. Tschaplinski, G. A. Tuskan, Z.-M. Cheng*, **X. Yang***, Diversity and conservation of plant small secreted proteins associated with arbuscular mycorrhizal symbiosis. *Horticulture Research* **9**, uhac043 (2022). doi: 10.1093/hr/uhac043
119. R. Hu, J. Zhang, S. Jawdy, A. Sreedasyam, A. Lipzen, M. Wang, V. Ng, C. Daum, K. Keymanesh, D. Liu, H. Lu, P. Ranjan, J.-G. Chen, W. Muchero, T. J. Tschaplinski, G. A. Tuskan, J. Schmutz, **X. Yang***, Comparative genomics analysis of drought response between obligate CAM and C_3 photosynthesis plants. *Journal of Plant Physiology* **277**, 153791 (2022). doi: 10.1016/j.jplph.2022.153791
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