

Jack P. Wang

Department of Forestry and Environmental Resources
North Carolina State University

Education and Training

Waikato University	New Zealand	Chemistry & Biology	BS	2006
North Carolina State University	USA	Forestry & Env. Res.	PhD	2012
North Carolina State University	USA	Forestry & Env. Res.	Postdoc	2012

Research and Professional Experience

2024–present	Associate Professor, Department of Forestry and Environmental Resources, NC State University
2019–present	Co-Founder and CSO, TreeCo Inc. (NCSU Startup Company), Raleigh, NC
2018–present	Director, Forest Biotechnology Program, NC State University
2018–2024	Assistant Professor, Department of Forestry and Environmental Resources, NC State University
2018–2023	Visiting Teaching Professor, Northeast Forestry University, Harbin, China

Scholarly and Professional Honors

- Entrepreneur of the Year Award, NCSU, 2024
- Invited Panel on Breakthrough Technologies: Opportunities in Military Medicine and Biosecurity, Support to the Warfighter Symposium, NC Biotech Center, Raleigh, NC (2024)
- Excellence in Forest Genomics and Biotechnology Award, International Union of Forest Research Organizations (IUFRO), 2022
- University Faculty Scholar Award, NCSU, 2022
- Goodnight Early Career Innovators Award, NCSU, 2021
- Co-Organizer and Speaker, documentary on “*Forest Genetics: Climate Change, Ecosystem Sustainability, and Human Health*”, iBiology, 2020
- Invited Panel on Genome Editing, Ag Tech Showcase, NC Biotechnology Center, 2019
- Invited Young Researcher, Marcus Wallenberg Prize (MWP) Ceremony, Stockholm, Sweden, 2017
- 3rd Place Award, MWP Young Researcher Symposium, Stockholm, Sweden, 2017
- 1st Place Award, The 5th Graduate Research Symposium, NCSU, 2010
- Jordan Family Graduate Fellowship in Natural Resource Innovation, NCSU, 2008 – 2012

Ad hoc Peer Review

Provides reviews to journals including *Nature Plant*, *Proceedings of the National Academy of Sciences USA*, *Plant Physiology*, *Molecular Plant*, *Frontiers in Plant Science*, *Planta*, *Journal of Plant Research*, *Journal of Biological Chemistry*, *PLoS One*, *Biofuels*, *Bioproducts & Biorefining*, *PeerJ*, *The CRISPR Journal*

Professional Activities


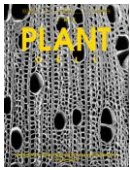

- Scientific Committee Member, International Symposium of Wood Fiber and Pulping Chemistry 2025 (ISWFPC 2025)
- Trainer, *Molecular Biotechnology Training Program (MBTP)*, NCSU, 2021–present
- Reviewing Editor, *Frontiers in Plant Science*, 2020 – present
- Scientific Advisor, Christmas Tree Genetics Program, NCSU, 2020 – present
- Co-Organizer, *International Union of Forest Research Organizations (IUFRO) Tree Biotechnology Conference*, 2019 in Raleigh, NC; 2022 in Harbin, China; 2024 in Maryland.
- Scientific Advisory Board Member, Forest Restoration Alliance, USA, 2018 – present
- Co-Organizer, *International Symposium on Forest Tree Molecular Biology and Biotechnology (FTMB)*, Harbin, China, 2018

Invited Talks: 46 since 2009

Mentoring: 6 Graduate students, 6 undergraduates, 4 postdocs, and 4 research associates.

Teaching: Developed and taught a new undergraduate level (ES 495) course titled “Biotechnology, Conservation, and Society”

Research Highlights

	<p>Cover Story</p> <p>Multiplex CRISPR-Editing of Wood for Sustainable Fiber Production (2023). <i>Science</i> doi:10.1126/science.add4514.</p> <p>Also featured on the <i>Science</i> homepage, by <i>Nature Materials</i>, <i>Nature Ecology and Evolution</i>, <i>The CRISPR Journal</i>, and many news coverages.</p>
	<p>Cover Story</p> <p>Hierarchical transcription factor and chromatin binding network for wood formation in <i>Populus trichocarpa</i> (2019). <i>The Plant Cell</i> doi:10.1105/tpc.18.00620.</p> <p>Also featured on <i>ScienceDaily</i> and <i>US Department of Energy</i> homepage.</p>
	<p>Top Story in Science 360 (NSF’s Research Digest)</p> <p>Improving wood properties for wood utilization through multi-omics integration in lignin biosynthesis (2018). <i>Nature Communications</i> 9:1579.</p> <p>Also featured in <i>Nanowerk</i>, <i>Phys.org</i>, <i>Green Car Congress</i>, <i>Science Daily</i>, <i>Newswise</i>, <i>Market Business News</i>, and <i>PlanetSave</i>.</p>

Refereed Journal Publications

1. Bing RG, Sulis DB, Carey MJ, Manesh MJH, Ford KC, Straub CT, Laemthong T, Alexander BH, Willard DJ, Jiang X, Yang C, **Wang JP**, Adams MWW, Kelly RM (2024). Beyond Low Lignin: Identifying the Primary Barrier to Plant Biomass Conversion by Fermentative Bacteria. *Science Advances* doi:10.1126/sciadv.adq4941.
2. Li W, Lin YCJ, Chen YL, Zhou C, Li S, Ridder ND, Oliveira DM, Zhang L, Xhang B, **Wang JP**, Xu C, Fu X, Luo K, Wu AM, Demura T, Lu MZ, Zhou Y, Li L, Umezawa T, Boerjan W, Chiang VL (2024). Woody Plant Cell Walls: Fundamental and Utilization. *Molecular Plant* 17, 112-140.
3. *Sulis D, Jiang X, Yang C, Matthews ML, Marques B, Miller Z, Lan K, Cofre-Vega Carlos, Liu B, Sun R, Sederoff H, Bing R, Sun X, Williams CM, Jameel H, Phillips R, Chang HM, Peszlen I, Huang YY, Li W, Kelly RM, Sederoff RR, Chiang VL, Barrangou R* [✉], **Wang JP** [✉] (2023). Multiplex CRISPR-Editing of Wood for Sustainable Fiber Production. *Science* 381, 216-221.
4. *Bing RG, Carey MJ, Laemthong T, Willard DJ, Crosby JR, Sulis DB, Wang JP, Adams MWW, Kelly RM* (2023) Fermentative Conversion of Unpretreated Plant Biomass: A Thermophilic Threshold for Indigenous Microbial Growth. *Bioresource Technology* 367, 128275.
5. Dai X, Zhai R, Lin JJ, Wang Z, Meng D, Meng L, Mao Y, Ma H, Zhang B, Sun Y, Li S, Zhou C, Lin Y, **Wang JP**, Chiang VL, Li W (2023) Cell-type Specific PtrWOX4a and PtrVCS2 form Regulatory Nexus with a Histone Modification System for Stem Cambium Development in *Populus trichocarpa*. *Nature Plant* 9, 96-111.
6. *Chen H, Neubauer M, Wang JP* [✉] (2022). Enhancing HR Frequency for Precise Genome Editing in Plants. *Frontiers in Plant Science* 1171.
7. Liu H, Gao J, Sun J, Li S, Zhang B, Wang Z, Zhou C, *Sulis DB, Wang JP, Chiang VL, Li W* (2022). Dimerization of PtrMYB074 and PtrWRKY19 mediates transcriptional activation of PtrBHLH186 for secondary xylem development in *Populus trichocarpa*. *New Phytologist* doi:10.1111/nph.18028.
8. *Bing RG, Straub CT, Sulis DB, Wang JP, Adams MWW, Kelly RM* (2022). Plant biomass fermentation by the extreme thermophile *Caldicellulosiruptor bescii* for co-production of green hydrogen and acetone: techno-economic analysis. *Bioresource Technology* 126780.
9. Yu J, Zhou C, Li D, Li S, Lin YCJ, **Wang JP**, Chiang VL, Li W (2022). A PtrLBD39-Mediated Transcriptional Network Regulates Tension Wood Formation in *Populus trichocarpa*. *Plant Communications* doi:10.1016/j.xplc.2021.100250.
10. *Lin CY, Yi S, Song J, Chen HC, Shi R, Yang C, Liu J, Tunlaya-Anukit S, Liu B, Loziuk PL, Williams CM, Muddiman DC, Lin CH, Sederoff R* [✉], **Wang JP** [✉], Chiang VL [✉] (2021). Enzyme complexes of Ptr4CL-PtrHCT modulate co-enzyme A ligation of hydroxycinnamic acids for monolignol biosynthesis in *Populus trichocarpa*. *Frontiers in Plant Biology* doi:10.3389/fpls.2021.727932.
11. de Vries L, Brouckaert M, Chanoca A, Kim H, Regner M, Timokhin V, *Sun Y, De Meester B, Van Doorselaere J, Goeminne G, Chiang VL, Wang JP, Ralph J, Morreel K, Vanholme R, Boerjan W* (2021). CRISPR-Cas9 Editing of Caffeoyl Shikimate Esterase 1 and 2 Shows Their Importance and Partial Redundancy in Lignification in *Populus tremula* × *P. alba*. *Plant Biotechnology Journal*. doi: 10.1111/pbi.13651.
12. *Bing RG, Sulis DB, Wang JP, Adams MWW, Kelly RM* (2021). Thermophilic microbial deconstruction and conversion of natural and transgenic lignocellulose. *Environmental Microbiology Reports* doi: 10.1111/1758-2229.12943.

13. Liu B, Liu J, Yu J, Wang Z, Sun Y, Lin YCJ, Chiang VL, Li W, **Wang JP** [✉] (2021). Transcriptional reprogramming of xylem cell wall biosynthesis in tension wood of *Populus trichocarpa*. *Plant Physiology* doi:10.1093/plphys/kiab038.
14. Matthews ML, **Wang JP**, Sederoff RR, Chiang VL, Williams CM (2021). A multiscale model of lignin biosynthesis for predicting bioenergy traits in *Populus trichocarpa*. *Computational and Structural Biotechnology Journal* 19: 168-182.
15. Wang Z, Mao Y, Gao J, Guo Y, Liu X, Li S, Lin YCJ, Chen H, **Wang JP**, Chiang VL, Li W (2020). PtrMYB161 mediates feedback regulation of *PtrSND1* family genes for wood formation in *Populus trichocarpa*. *Plant Physiology* doi:10.1104/pp.20.01033.
16. Sulis B, **Wang JP** [✉] (2020). Regulation of lignin biosynthesis by post-translational protein modifications *Frontiers in Plant Science* doi:10.3389/fpls.2020.00914.
17. Liu B, **Wang JP** [✉] (2020). Tracheid associated transcription factors in loblolly pine. *Tree Physiology* 40:700-703.
18. Matthews ML, **Wang JP**, Muddiman DC, Sederoff RR, Chiang VL, Williams CM (2020). Modeling cross-regulatory influences on monolignol transcripts and proteins in *Populus trichocarpa* under single and combinatorial monolignol gene knockdowns. *PLoS Computational Biology* doi:10.1101/677047.
19. Straub C, Bing RG, **Wang JP**, Chiang V, Adams M, Kelly R (2020). Use of the lignocellulose-degrading bacterium *Caldicellulosiruptor bescii* to assess recalcitrance and conversion of wild-type and transgenic poplar. *Biotechnology for Biofuels* 13:43.
20. Kim H, Li Q, Karlen S, Smith R, Shi R, Liu J, Yang C, **Wang JP**, Chang HM, Sederoff RR, Ralph J, Chiang V (2020). Monolignol benzoates incorporate into the lignin of transgenic *Populus trichocarpa* depleted in C3H and C4H. *ACS Sustainable Chemistry & Engineering* 8:3644-3654.
21. Straub C, Khatibi P, **Wang JP**, Conway J, Williams-Rhaesa A, Peszlen I, Chiang V, Adams M, Kelly R (2019). Quantitative fermentation of unpretreated transgenic poplar by *Caldicellulosiruptor bescii*. *Nature Communications* 10:3548.
22. Yeh CS, Wang Z, Miao F, Ma H, Kao CT, Hsu TS, Yu JH, Hung ET, Lin CC, Kuan CY, Zhou C, Qu GZ, Jiang J, Liu G, **Wang JP**, Li W, Chiang BL, Chang TH, Lin YCJ (2019). A novel synthetic genetic array-based yeast one-hybrid system with high discovery rate and short processing time. *Genome Research* 29:1343-1351.
23. Myburg AA, Hussey SG, **Wang JP**, Street NR, Mizrahi E (2019). Systems and synthetic biology of forest trees: A bioengineering paradigm for woody biomass feedstocks. *Frontiers in Plant Science* 10:775.
24. Chen H*, **Wang JP***, Liu H, Li H, Lin YCJ, Shi R, Yang C, Gao J, Li Q, Sederoff RR, Li W, Chiang VL (2019). Quantitative hierarchical transcription factor and chromatin binding network in *Populus trichocarpa* for wood formation. *The Plant Cell* 31:602-626 (Cover Story).
25. **Wang JP**, Liu B, Sun Y, Chiang VL, Sederoff RR (2019). Enzyme-enzyme interactions in monolignol biosynthesis. *Frontiers in Plant Science* 9:1942.
26. **Wang JP**, Matthews ML, Naik PP, Williams CM, Ducoste JJ, Sederoff RR, Chiang VL (2019). Flux modeling for monolignol biosynthesis. *Current Opinion in Biotechnology* 56:187-192.
27. Li S, Lin YCJ, Wang P, Zhang B, Li M, Chen S, Shi R, Tunlaya-Anukit S, Liu X, Wang Z, Dai X, Yu J, Zhou C, Liu B, **Wang JP**, Chiang VL, Li W (2018). Histone acetylation cooperating with AREB1

transcription factor regulates drought response and tolerance in *Populus trichocarpa*. *The Plant Cell* 31:663-686.

28. Yan X, Liu J, Kim H, Liu B, Huang X, Yang Z, Lin YC, Chen H, Yang C, Wang JP, Muddiman D, Ralph J, Sederoff R, Li Q, Chiang VL (2018). PtrCAD1 and PtrCCR2 complex formation in monolignol biosynthesis in *Populus trichocarpa*. *New Phytologist* 222:244-260.
29. Wang JP, Matthews M, Shi R, Yang C, Tunlaya-Anukit S, Chen HC, Li Q, Liu J, Lin CY, Naik P, Sun YH, Loziuk PL, Yeh TF, Kim H, Gjersing E, Shollenberger T, Shuford CM, Song J, Miller Z, Huang YY, Edmonds CW, Lin YC, Wei Li, Chen H, Peszlen I, Williams CM, Ducoste JJ, Ralph J, Chang H, Muddiman DC, Davis M, Smith C, Isik F, Sederoff RR, Chiang VL (2018). Improving wood properties for wood utilization through multi-omics integration in lignin biosynthesis. *Nature Communications* 9:1579.
30. Naik P, Wang JP, Sederoff RR, Chiang V, Williams C, Ducoste J (2018). Assessing the impact of the 4CL enzyme complex on the robustness of monolignol biosynthesis using metabolic pathway analysis. *PLoS One* 13: e0193896.
31. Lin YCJ, Chen H, Li Q, Li W, Wang JP, Shi R, Tunlaya-Anukit S, Shuai P, Wang Z, Ma H, Li H, Sun YH, Sederoff RR, Chiang VL (2017) Reciprocal cross-regulation of VND and SND multigene TF families for wood formation in *Populus trichocarpa*. *Proceedings of the National Academy of Sciences USA* 114: E9722-E9729.
32. Shi R*, Wang JP*, Lin YC, Li Q, Sun YH, Chen H, Sederoff RR, Chiang VL (2017). Tissue and cell-type co-expression networks of transcription factors and wood component genes in *Populus trichocarpa*. *Planta* 245:927-938
33. Wang JP, Tunlaya-Anukit S, Shi R, Yeh TF, Chuang L, Isik F, Yang C, Liu J, Li Q, Loziuk PL, Naik PP, Muddiman DC, Ducoste JJ, Williams CM, Sederoff RR, Chiang VL (2017). A proteomic based quantitative analysis of the relationship between monolignol biosynthetic protein abundance and lignin content using transgenic *Populus trichocarpa*. In: Quideau S & Yoshida K (eds) *Recent Advances in Polyphenol Research (Volume 5)*.
34. Lin CY, Li Q, Tunlaya-Anukit, Shi R, Sun YH, Wang JP, Liu J, Loziuk P, Edmonds CW, Miller ZD, Peszlen I, Muddiman DC, Sederoff RR, Chiang VL (2016). A cell wall-bound anionic peroxidase, *PtrPO21*, is involved in lignin polymerization in *Populus trichocarpa*. *Tree Genetics & Genomes* 12:1-18.
35. Wang JP*, Chuang L*, Loziuk PL, Chen H, Lin YC, Shi R, Qu GZ, Muddiman DC, Sederoff RR, Chiang VL (2015). Phosphorylation is an on/off switch for 5-hydroxyconiferaldehyde O-methyltransferase activity in poplar monolignol biosynthesis. *Proceedings of the National Academy of Sciences USA* 112:8481-8486 (*equal contribution first author).
36. Lin CY*, Wang JP*, Chen HC, Liu J, Sederoff RR, Chiang VL (2015). 4-Coumaroyl and caffeoyl shikimic acids inhibit 4-coumaric acid:coenzyme A ligases and modulate metabolic flux for 3-hydroxylation in monolignol biosynthesis of *Populus trichocarpa*. *Molecular Plant* 8:176-187.
37. Loziuk PL, Parker J, Li W, Lin CY, Wang JP, Li Q, Sederoff RR, Chiang VL, Muddiman DC (2015). Elucidation of xylem-specific transcription factors and absolute quantification of enzymes regulating cellulose biosynthesis in *Populus trichocarpa*. *Journal of Proteome*

Research 14:4158-4168.

38. Liu J, Hai G, Wang C, Cao S, Xu W, Jia Z, Yang C, **Wang JP**, Dai S, Cheng Y (2015). Comparative proteomic analysis of *Populus trichocarpa* early stem from primary to secondary growth. *Journal of Proteomics* 126:94-108.
39. **Wang JP**, Naik PP, Chen HC, Shi R, Lin CY, Liu J, Shuford CM, Li Q, Sun YH, Tunlaya-Anukit S, Williams CM, Muddiman DC, Ducoste JJ, Sederoff RR, Chiang VL (2014). Complete proteomic based enzyme reaction and inhibition kinetics reveal how monolignol biosynthetic enzyme families affect metabolic-flux and lignin. *The Plant Cell* 26:894-914.
40. Chen HC*, Song J*, **Wang JP***, Lin YC, Ducoste JJ, Shuford CM, Liu J, Li Q, Shi R, Isik F, Nepomuceno A, Muddiman DC, Williams C, Sederoff RR, Chiang VL (2014). Systems biology of lignin biosynthesis in *Populus trichocarpa*: heteromeric 4-coumaric acid:Coenzyme A ligase (4CL) protein complex formation, regulation and numerical modeling. *The Plant Cell* 26:876-893 (*equal contribution first author).
41. Li Q, Song J, Peng S, **Wang JP**, Qu GZ, Sederoff RR, Chiang VL (2014). Plant biotechnology for lignocellulosic biofuel production. *Plant Biotechnology Journal* 12:1174-1192 (*Cover Story*).
42. Lin YC, Li W, Chen H, Li Q, Sun YH, Shi R, Lin CY, **Wang JP**, Chen HC, Chuang L, Qu G, Sederoff RR, Chiang VL (2014). A simple high throughput xylem protoplast system for studying wood formation. *Nature Protocols* 9:2194-2205.
43. Loziuk P, **Wang JP**, Li Q, Sederoff RR, Chiang VL, Muddiman DC (2013). Understanding the role of proteolytic digestion on discovery and targeted proteomic measurements using liquid chromatography tandem mass spectrometry and design of experiments. *Journal of Proteome Research* 10/2013.
44. Shi R, Shuford CM, **Wang JP**, Sun YH, Yang Z, Chen HC, Tunlaya-Anukit S, Li Q, Liu J, Muddiman DC, Sederoff RR, Chiang VL (2013). Regulation of phenylalanine ammonia-lyase (PAL) gene family in wood forming tissue of *Populus trichocarpa*. *Planta* 238: 487-497.
45. Chen HC, Song J, Williams CM, Shuford CM, Liu J, **Wang JP**, Li Q, Shi R, Gokce E, Ducoste J, Muddiman DC, Sederoff RR, Chiang VL (2013). Monolignol pathway 4-coumaric acid:CoA ligases in *Populus trichocarpa*: novel specificity, metabolic regulation, and simulation of CoA ligation fluxes. *Plant Physiology* 161: 1501-1516.
46. **Wang JP**, Shuford CM, Li Q, Song J, Lin YC, Sun YC, Chen HC, Williams CM, Muddiman DC, Sederoff RR, Chiang VL (2012). Functional redundancy of the two 5-hydroxylases in monolignol biosynthesis of *Populus trichocarpa*: LC-MS/MS based protein quantification and metabolic flux analysis. *Planta* 236: 795-808.
47. Shuford CM, Li Q, Sun YC, Chen HC, **Wang JP**, Shi R, Sederoff RR, Chiang VL, Muddiman DC (2012). Comprehensive quantification of monolignol pathway enzymes in *Populus trichocarpa* by protein cleavage isotope dilution mass spectrometry. *Journal of Proteome Research* 04/2012.
48. Li Q, Min D, **Wang JP**, Peszlen I, Horvath L, Horvath B, Nishimura Y, Jameel H, Chang HM, Chiang VL (2011). Down-regulation of glycosyltransferase 8D genes in *Populus*

trichocarpa caused reduced mechanical strength and xylan content in wood. *Tree Physiology* 31: 226-36.

49. Yeh TF, **Wang JP**, Shi R, Sun YH and Chiang VL (2007). A novel *O*-methyl transferase-like gene with drastic ectopic expression in response to tension wood formation in *Populus trichocarpa*. *Cellulose Chemistry and Technology* 41: 521-528.