

Daniel C. Burcham

Contact

Information

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Honors and awards

Ministry of National Development High Performance Program (Singapore)	2012 – 2021
Donald L. Mader Forestry Scholarship (Univ. of Mass.)	2016
Gamma Sigma Delta Honor Society of Agriculture (Univ. of Mass.)	2016
Louise Roselle Fellowship in Public Horticulture (Univ. of Del.)	2008 – 2009
Longwood Graduate Fellowship (Univ. of Del.)	2007 – 2009
Ohio Academic Scholarship (Ohio State Univ.)	2003 – 2007

Education

University of Massachusetts	2020
Ph.D., Environmental Conservation	
Concentration: Forest Resources and Arboriculture	
Advisor: Dr. Brian Kane	
Dissertation: <i>The effect of pruning treatments on the vibration properties and wind-induced bending moments of Senegal mahogany (<u>Khaya senegalensis</u>) and rain tree (<u>Samanea saman</u>) in Singapore</i>	
University of Delaware	2009
M.Sc., Public Horticulture	
Advisor: Dr. Robert Lyons	
Longwood Graduate Program	
Museum Studies Certificate	
The Ohio State University	2007
B.Sc., Horticulture	
Cum Laude	

Employment

Colorado State University	
Department of Horticulture and Landscape Architecture	
❖ Assistant Professor	2021 – Present
National Parks Board, Singapore	
Centre for Urban Greenery and Ecology	
❖ Deputy Director, Urban Tree Research	2019 – 2021
❖ Senior Arboriculture Researcher	2013 – 2019
❖ Arboriculture Researcher	2009 – 2013

Professional memberships and certifications

International Society of Arboriculture Certified Arborist #SG-0420A	2010 – Present
Member, International Society of Arboriculture (ISA)	2006 – Present
Member, Singapore Arboriculture Society (SAS)	2009 – 2019

Research

Interests

Tree risk assessment and management
Tree maintenance and pruning

Research and scholarly achievements

Peer-reviewed journal articles

Citation Indices ⁺	
Citations	208
h-index	8
i10-index	6

⁺Source: google Scholar; updated 6 Dec 2022

20. Tan, D.S., Maiti, R., Tan, Y.W., Wong, B.Z.J., Liew, Y., Tan, J.H., Lee, D.T.T., **Burcham, D.C.** 2022. General feasibility of physical models of tree branches. *Front Forests Glob Change* 5:835930. doi:10.3389/ffgc.2022.835930
19. **Burcham, D.C.**, Au, S.K. 2022. Identifying modal properties of trees with Bayesian inference. *Agric Forest Meteorol.* 316:108804.
18. Jackson, T., Sethi, S., Dellwik, E., Angelou, N., Bunce, A., van Emmerik, T., Duperat, M., Ruel, J.C., Wellpott, A., Van Bloem, S., Achim, A., Kane, B., Ciruzzi, D.M., Loheide, S.P., James, K., **Burcham, D.C.**, Moore, J., Schindler, D., Kolbe, S., Wiegmann, K., Rudnicki, M., Lieffers, V.J., Selker, J., Gougherty, A.V., Newson, T., Koeser, A., Miesbauer, J., Samelson, R., Wagner, J., Ambrose, A.R., Detter, A., Rust, S., Coomes, D., Gardiner, B. 2021. The motion of trees in the wind: A data synthesis. *Biogeosciences* 18(13):4059-4072.
17. **Burcham, D.C.**, Autio, W.R., Modarres-Sadeghi, Y., Kane, B. 2021. After pruning, wind-induced bending moments and vibration decrease more on reduced than raised Senegal mahogany (*Khaya senegalensis*). *Urban Forest Urban Green* 61:127100.
16. Chan, W.L., Eng, Y., Ge, Z., Lim, C.W.C., Gobeawan, L., Poh, H.J., Wise, D.J., **Burcham, D.C.**, Lee, D., Cui, Y., Khoo, B.C. 2020. Wind loading on scaled down fractal models of major urban tree species in Singapore. *Forests* 11(8):803.
15. Poh, H.J., Chan, W.L., Wise, D.J., Lim, C.W.C., Khoo, B.C., Gobeawan, L., Ge, Z., Eng, Y., Peng, J.X., Raghavan, V.S.G., Jadhav, S.S., Lou, J., Cui, Y.D., Lee, H.P., **Burcham, D.C.**, Lee, D., Li, K., Lee, I. 2020. Wind load prediction on single tree with integrated approach of L-system fractal model, wind tunnel, and tree aerodynamic simulation. *AIP Advances* 10(7):075202.
14. Chan, W.L., Cui, Y., Jadhav, S.S., Khoo, B.C., Lee, H.P., Lim, C.W.C., Gobeawan, L., Wise, D.J., Ge, Z., Poh, H.J., Raghavan, V., Lin, E., **Burcham, D.C.** 2020. *International Journal of Modern Physics B* 34(14-16):2040087.
13. **Burcham, D.C.**; Autio, W.R.; James, K.R.; Modarres-Sadeghi, Y.; Kane, B. 2020. Effect of pruning type and severity on mass and vibration properties of Senegal mahogany (*Khaya senegalensis*) and rain tree (*Samanea saman*). *Trees: Struct Funct* 34(1):213-228.
12. Jackson, T.; Shenkin, A.; Moore, J.; Bunce, A.; van Emmerik, T.; Kane, B.; **Burcham, D.**; James, K.; Selker, J.; Calders, K.; Origo, N.; Disney, M.; Burt, A.; Wilkes, P.; Raunonen, P.; Gonzalez de Tanago Menaca, J.; Lau, A.; Herold, M.; Goodman, R.C.; Fourcaud, T.; Malhi, Y. 2019. An architectural understanding of natural sway frequencies in trees. *J Roy Soc Interface* 16(155):20190116.
11. **Burcham, D.C.**; Brazee, N.J.; Marra, R.; Kane, B. 2019. Can sonic tomography predict loss in load bearing capacity for trees with defects? A comparison of sonic tomograms with destructive measurements. *Trees: Struct Funct* 33(3):681 – 695.
10. Ghosh, S.; Pal, P.; Ow, L.F.; **Burcham, D.C.**; Rakshit, A. 2018. Effect of compost and hydroabsorbent polymer on tree growth and soil properties in a tropical urban environment. *Commun Soil Sci Plan* 49(10):1229 – 1238.
9. **Burcham, D.C.**; Abarrientos, N.V.; Wong, J.Y.; Ali, M.I.M.; Fong, Y.K.; Schwarze, F.W.M.R. 2017. Field evaluation of *Trichoderma* spp. as a biological control agent to prevent wood decay on Benin mahogany (*Khaya grandifoliola*) and rain tree (*Samanea saman*) in Singapore. *Biol Control* 114:114 – 124.

8. Ghosh, S.; Scharenbroch, B.C.; **Burcham, D.C.**; Ow, L.F.; Shenbagavalli, S.; Mahimairaja, S. 2016. Influence of soil properties on street tree attributes in Singapore. *Urban Ecosyst* 19(2):949 – 967.
7. **Burcham, D.C.**; Wong, J.Y.; Ali, M.I.M.; Abarrientos, N.V.; Fong, Y.K.; Schwarze, F.W.M.R. 2015. Characterization of host-fungus interactions among wood decay fungi associated with *Khaya senegalensis* (Desr.) A. Juss (Meliaceae) in Singapore. *Forest Pathol* 45:492 – 504.
6. **Burcham, D.C.**; Lyons, R.E. 2013. An evaluation of tree procurement and acquisition strategies for urban planting. *J Env Hort* 31(3):153 – 161.
5. **Burcham, D.C.**; Leong, E.C.; Fong, Y.K.; Tan, P.Y. 2013. Infrared camera measurements reveal diurnal variation in the effect of mechanically induced internal voids on stem temperatures passively heated by the sun. *Arboric Urban Forest* 39(1):31 – 41.
4. **Burcham, D.C.**; Leong, E.C.; Fong, Y.K.; Tan P.Y. 2012. An evaluation of internal defects and their effect on trunk surface temperature in *Casuarina equisetifolia* L. (Casuarinaceae). *Arboric Urban Forest* 38(6):277 – 286.
3. Leong, E.C.; **Burcham, D.C.**; Fong, Y.K. 2012. A purposeful classification of tree decay detection tools. *Arboric J* 34(2):1 – 25.
2. **Burcham, D.C.**; Leong, E.C.; Fong, Y.K. 2012. Passive infrared camera measurements demonstrate modest effect of mechanically induced internal voids on *Dracaena fragrans* stem temperature. *Urban Forest Urban Green* 11(2):169 – 178.
1. **Burcham, D.C.**; Ghosh, S.; Leong, E.C.; Fong, Y.K. 2011. An evaluation of an infrared camera technique for detecting artificially induced internal voids in *Syzygium grande*. *Arboric Urban Forest* 37(3):93 – 98.

Articles submitted

2. **Burcham, D.C.**, Brazee, N.J., Marra, R., Kane, B. Geometry matters for sonic tomography of trees with one commercial device. *Trees: Struct Funct.* [Submitted 17 Sep 2022 - Revising]
1. Ha, Z., Seyler, B., Laffitte, B., Deng, L., **Burcham, D.C.**, Zhang, M., Wang, Y., Wang, X., Li, P., Tang, Y. Assessing the breadth of urban forestry research across greater China: A scoping review (2009-2019). *Environment Sci Pol.* [Submitted 7 Jul 2022]

Articles in preparation

4. **Burcham, D.C.**, Au, S.K. Modal tracking. Intended outlet: *J Roy Soc Interface*.
3. **Burcham, D.C.** New insights from old discoveries: A broad review of the scientific literature on tree pruning practices. Intended outlet: *Urban Forest Urban Green*.
2. Brazee, N.J., **Burcham, D.C.** Incidence and severity of internal decay in landscape oaks (*Quercus* spp.). Intended outlet: *Forests*.
1. Lai, H.R., Yee, A.T.K., **Burcham, D.C.** Estimating size-dependent growth rates of tropical trees from a large tree inventory dataset. Intended outlet: *Forestry*.

Books and reports

2. **Burcham, D.C.**; Wong, J.Y.; Abarrientos, N.V.; Ali, M.I.M.; Fong, Y.K.; Schwarze, F.W.M.R. 2017. In vitro evaluation of antagonism by *Trichoderma* spp. towards *Phellinus noxius* associated with rain tree (*Samanea saman*) and Senegal mahogany (*Khaya senegalensis*) in Singapore. <https://doi.org/10.1101/151753>.
1. Sanderson, P.; Fong, Y.K.; **Burcham, D.C.** 2010. *Tropical Gardeners' Guide to Healthy Plants*, 2nd Ed. National Parks Board: Singapore.

Invited presentations

18. **Burcham, D.C.** 2023. Best practices for tree pruning. Colorado Master Gardener Webinar Series. 7 Feb 2023.

17. **Burcham, D.C.** 2022. Managing trees to enhance their natural resilience to strong winds. Central Wyoming Tree Care Workshop, Casper, WY. 8 Oct 2022 [58 attendees].
16. **Burcham, D.C.** 2022. Best practices for pruning trees in a time of climate change. Plant Select Annual Meeting, Denver, CO. 9 Jun 2022 [235 attendees].
15. **Burcham, D.C.** 2022. New insights from old discoveries: What does the scientific literature say about pruning large, mature trees? Rochester Arborist Workshop, Minnesota Society of Arboriculture, Rochester, MN. 24 Feb 2022 [220 attendees].
14. **Burcham, D.C.** 2022. Think twice, cut once: Pruning treatments do not equally alter the interaction between wind and trees. Rochester Arborist Workshop, Minnesota Society of Arboriculture, Rochester, MN. 24 Feb 2022 [220 attendees].
13. **Burcham, D.C.** 2022. Using vibration monitoring to infer details about the physical condition of trees. ProGreen Expo, Denver, CO. 2 Feb 2022 [30 attendees].
12. **Burcham, D.C.** 2022. Best practices for pruning large, mature trees to improve condition and extend longevity. ProGreen Expo, Denver, CO. 2 Feb 2022 [100 attendees].
11. **Burcham, D.C.** 2021. Think twice, cut once: Pruning treatments do not equally alter the interaction between wind and large trees. Front Range Urban Forestry Council, Colorado Tree Coalition. 18 Nov 2021. Online Webinar [35 attendees].
10. **Burcham, D.C.** 2021. Evaluating loss of load-bearing capacity using sonic tomography. UMass Amherst Research Workshop: Comparing Likelihood of Failure Assessments Using Visual, Basic, and Advanced Assessment Techniques. 29 – 30 Jul 2021. Amherst, MA [20 attendees].
9. **Burcham, D.C.** 2021. Changes in the dynamic properties of trees in natural winds after pruning. 19th Sachverständigen-Arbeitsgemeinschaft Baumstatik (Tree Statics Expert Working Group) Workshop. 18 Mar 2021. Online Webinar [135 attendees].
8. **Burcham, D.C.** 2018. Estimating the load-bearing capacity of tree parts from sonic tomograms. Department of Environmental Science and Engineering Seminar; 10 Dec 2018; Sichuan University, Chengdu, China [45 attendees].
7. **Burcham, D.C.** 2018. Estimating the load-bearing capacity of tree parts from sonic tomograms. International Arboriculture Summit; 14 – 16 Nov 2018; Hong Kong SAR, China.
6. **Burcham, D.C.** 2018. Pruning methods to reduce the likelihood of failure for large tropical trees. International Tropical Arboriculture Conference; 25 – 27 Sep 2018; Kuala Lumpur, Malaysia.
5. **Burcham, D.C.** 2017. Improving arboriculture practice with research and training. International Summit on Arboriculture in the Tropics (Keynote Presentation); 21 Sep 2017; Bogor, Indonesia [82 attendees].
4. **Burcham, D.C.** 2014. Pruning trees to reduce the likelihood of failure. Centre for Urban Greenery and Ecology Research Seminar; 19 Nov 2014; Singapore.
3. **Burcham, D.C.** 2013. Infrared cameras: What temperature can (and can't) reveal about tree health. Arboriculture Australia Annual Conference; 26 – 30 Apr 2013; Melbourne, Australia [260 attendees].
2. **Burcham, D.C.** 2011. Evaluating the efficacy of non-destructive tree diagnostic assessments using an infrared camera. Centre for Urban Greenery and Ecology Research Seminar; 28 Mar 2011; Singapore.
1. **Burcham, D.C.** 2010. Controlled evaluations of an infrared camera technique for detecting internal defects in woody stems. 4th Singapore Regional Arboriculture Seminar; 15 – 16 Nov 2010; Singapore.

Contributed presentations

6. **Burcham, D.C.** 2019. Effect of pruning treatments on wind-tree interaction for large, tropical trees. Workshop on Open-Grown and Urban Trees; IUFRO Working Party 8.03.06 Impact of Wind on Forests; 7 – 10 Apr 2019; University of Freiburg, Germany [40 attendees].

5. **Burcham, D.C. 2017.** Pruning strategies to reduce the likelihood of failure. ISA Annual Conference and Trade Show; 31 Jul – 2 Aug 2017; Washington, D.C., U.S.
4. Ghosh, S.; **Burcham, D.C.** 2014. Organic and synthetic soil amendments influence soil quality and growth of tropical urban trees. Proceedings of the 20th World Conference of Soil Science; 8 – 13 Jun 2014; Jeju, Korea.
3. **Burcham, D.C.**; Ghosh, S.; Mahimaraja, M.; Kristiansen, P. 2011. Evaluating the relationship between urban soil properties and street tree performance in Singapore. ISA Annual Conference and Trade Show; 23 – 27 Jul 2011; Sydney, Australia.
2. **Burcham, D.C.** 2009. An analysis of species selection and acquisition practices by community tree planting programs. Proceedings of the 109th American Society for Horticultural Science Annual Conference; 25 – 28 Jul 2009; St. Louis, Missouri, U.S.
1. **Burcham, D.C.** 2009. An analysis of urban tree planting programs and nursery production relationships. Abstracts of the ASHS Northeast Region Annual Meeting; 8 – 10 Jan 2009; Newark, Delaware, U.S. p. 551 – 552.

Grant applications

\$-	CSU Spur Projects RFP Sustainably cultivating urban forests for Western communities	2023
\$16,495	HICAHS Community-initiated small grants program Overcoming barriers to safety training for tree care professionals in Colorado	2022
\$19,224.88	Stanley Smith Horticultural Trust Enhancing collections management at the Colorado State University Heritage Arboretum	2022

Funded projects and other awards

\$934,800	Ministry of National Development, Singapore Wind-tree interaction: Physical performance of solid models in wind tunnel tests	2018 – 2021
\$852,000	Ministry of National Development, Singapore Trees and risk: Parameterization of mechanistic wind risk models in Singapore	2017 – 2020
\$20,500	National Parks Board, Singapore Computing inertial loss caused by trunk defects in standing trees	2016 – 2017
\$350,000	National Parks Board, Singapore The effects of pruning on dynamic wind loading of large tropical trees	2012 – 2014
\$200,000	National Parks Board and Agri-Food & Veterinary Authority, Singapore Development of biological pruning wound sealant for rain tree and Senegal mahogany using local <i>Trichoderma</i> spp. strains	2010 – 2013
\$120,000	National Parks Board, Singapore Evaluation of infrared cameras for decay detection in trees	2010 – 2011

Teaching

	Colorado State University	
Instructor	HORT 464A: Arboriculture (3 credits) 20 – 25 students (typical) every fall semester	2021 – present
Instructor	F/HORT 466: Urban and Community Forestry (3 credits) 5 – 10 students (typical) every fall semester	2022 – present
Instructor	HORT 321: Nursery Production and Management (3 credits) 10 – 15 students (typical) every other spring semester	2023
Guest lecturer	HORT 680A1: Topics in Horticulture The science and practice of arboriculture	20 Oct 2022

Guest lecturer	HORT 792: Seminar Growing trees for people in difficult environments	15 Nov 2022
Guest lecturer	HORT/LAND 192: Orientation to Horticulture and Landscape Architecture Introduction to the Colorado State University Heritage Arboretum	24-25 Aug 2022

Graduate Student Supervision

- Chair, D. Leinbach, M.S. Thesis, *Effect of common pruning treatments on wind loads of large, mature Colorado spruce (Picea pungens)*, Colorado State University, Horticulture and Landscape Architecture, Fall 2024
- Committee member, Li, J., M.S. Thesis, *Effect of drought stress on performance of turfgrass cultivars*, Colorado State University, Horticulture and Landscape Architecture, Fall 2024
- External committee member, A. Okun, M.S. Thesis, *Influence of diagnostic information on the consistency of tree risk assessments*, UMass-Amherst, Environmental Conservation, Fall 2022

University Service

Colorado State University

Member, Campus Arboretum Committee, Facilities Management	2021 – present
Member, Graduate Program Committee, Department of Horticulture and Landscape Architecture	2021 – present
Faculty Mentor, Undergraduate Internship Program, Department of Horticulture and Landscape Architecture	2022 - present

Professional Service, Outreach, and Engagement

Ad hoc reviewer <i>Acta Oecologia</i> (1), <i>Arboricultural Journal</i> (1), <i>Arboriculture and Urban Forestry</i> (1), <i>Biological Control</i> (1), <i>European Journal of Wood and Wood Products</i> (1), <i>Forests</i> (4), <i>Landscape and Urban Planning</i> (2), <i>Plant Disease</i> (2), <i>Scientific Reports</i> (2), <i>Urban Forestry & Urban Greening</i> (5)	2018 – present
Mentor, University of Delaware LEAP (Leadership, Engagement, Academics, Professionalism) Mentoring Program	2021 – present
Scientific Team, Denver Urban Field Station USDA Forest Service, Rocky Mountain Research Station	2021 – present
Member, Front Range Urban Forestry Expansion Initiative	2022 – present
Member, Land Use Code Audit Ad Hoc Committee, City of Fort Collins, Colorado	Oct – Dec 2022
Instructor, TreeForce Workforce Development Program, The Park People, Denver	10 Aug 2022
Volunteer Expert, Windsor Sick Tree Day, Town of Windsor Tree Board	28 Jun 2022
Member, Proposal Selection Committee, Request for Proposals on Urban Climate Resilience, Salazar Center for North American Conservation and City and County of Denver	Jun – Aug 2022
Media source, <i>Shade</i> by Sam Bloch, Random House	29 Nov 2021
Member, Urban Forest Strategic Plan Ad Hoc Committee, City of Fort Collins, Colorado	Sep – Dec 2021
Reviewer, Arborist's Certification Study Guide, Fourth Edition, International Society of Arboriculture, Chapter 9: Tree Support and Protection Systems	Dec 2020
Organizing Committee Member, Modeling wind-tree interaction: Novel approaches and practical applications webinar, Hosted	28 – 30 Oct 2020

by the National University of Singapore; Agency for Science, Technology and Research; and National Parks Board, Singapore [330 attendees]

Developer, *zloss* (<https://github.com/danielburcham/zloss>), MATLAB application for estimating strength loss to decayed trees using sonic tomograms 2017 – present