Dr. Robert VanBuren

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Education and Training

Rochester Institute of Tech	Biotechnology	BS	2007-2010
University of Illinois U C	Plant Biology	PhD	2010-2014
Donald Danforth Plant Science Center	Plant Genomics	Postdoc	2014-2016

Employment History

2023-present Associate Professor, Plant Resilience Institute, Plant Biology, Plant, Soil & Microbial Sciences, MSU, East Lansing, MI USA
2023-2024 Associate Professor, Plant Resilience Institute, Horticulture, MSU, East Lansing, MI USA
2016-2023 Assistant Professor, Plant Resilience Institute, Horticulture, MSU, East Lansing, MI USA
2014-2016 NSF-NPGI Postdoctoral Fellowship, DDPSC, St Louis, MO USA

All peer-reviewed publications from independent career

Published manuscripts:

1. Marks R*, Van Der Pas L, Schuster J, **VanBuren R***. Convergent evolution of desiccation tolerance in grasses. 2024. *Nature Plants*, *Corresponding authors

2. Marks R, Delgado P, Makonya GM, Cooper K, **VanBuren R**, Farant J. Polyploidy enhances desiccation tolerance in the grass Microchloa caffra. 2024 *Journal of Experimental Botany. https://doi.org/10.1093/jxb/erae126*

3. Bird K, Pires JC, **VanBuren R,** Xiong Z, Edger P. Dosage-sensitivity shapes how genes transcriptionally respond to allopolyploidy and homoeologous exchange in resynthesized Brassica napus. 2023 *Genetics*. https://doi.org/10.1093/genetics/iyad114

4. Goeckeritz C, Rhoades K, Childs KL, Iezzoni A, **VanBuren R***, Hollender C. Genome of tetraploid sour cherry (Prunus cerasus L.) 'Montmorency' identifies three distinct ancestral Prunus genomes. 2023 *Horticulture Research.* https://doi.org/10.1093/hr/uhad097 *corresponding author

5. Palande S, Kaste JAM, Roberts MD, Abá KS, Claucherty C, Dacon J, Doko R, Jayakody TB, Jeffery HR, Kelly N, Manousidaki A, Parks HM, Roggenkamp EM, Schumacher AM, Yang J, Percival S, Pardo J, Husbands AY, Krishnan A, Montgomery BL, Munch E, Thompson AM, Rougon-Cardoso A, Chitwood DH, **VanBuren R*** Topological data analysis reveals a core gene expression backbone that defines form and function across flowering plants. 2023 *PLoS Biology.* https://doi.org/10.1371/journal.pbio.3002397 *corresponding author

6. Marks R, Amezquita E, Percival S, Rougon-Cardoso A, Chibici-Reveanu C, Tebele S, Farrant J, Chitwood D, **VanBuren R**. A critical analysis of plant science literature reveals ongoing inequities. 2023 *PNAS*. https://doi.org/10.1073/pnas.221756412

7. Pardo J, Wai CM, Harman M, Nguyen A, Kremling K, Romay M, Lepak N, Bauerle T, Buckler E, Thompson A, **VanBuren R***. Cross-species predictive modeling reveals conserved drought responses between maize and sorghum. 2023 *PNAS.* https://doi.org/10.1073/pnas.2216894120

8. **VanBuren R***, Wai CM, Giarola V, Župunski M, Pardo J, Kalinowski M, Grossmann G, Bartels D. Core cellular and tissue-specific mechanisms enable desiccation tolerance in Craterostigma 2023 *Plant Journal*. https://doi.org/10.1111/tpj.16165 *corresponding author

9. Aubin BS, Wai CM, Raju SKK, Niederhuth CH, **VanBuren R***. Regulatory dynamics distinguishing desiccation tolerance strategies within resurrection grasses. 2023 *Plant Direct*. https://doi.org/10.1002/pld3.457 *corresponding author

10. Lipham Wilson M, **VanBuren R***. Leveraging millets for developing climate resilient agriculture. 2022 *Current Opinion in Biotechnology.* https://doi.org/10.1016/j.copbio.2022.102683 *corresponding author

11. Yue J, **VanBuren R***, Liu J, Fang J, Zhang X, Liao Z, Wai CM, Xu X, Chen S, Zhang S, Ma X, Ma Y, Yu H, Lin J, Zhou P, Huang Y, Deng B, Deng F, Zhao X, Yan H, Fatima M, Zerpa-Catanho D, Zhang X, Lin Z, Yang M, Chen NJ, Mora-Newcomer E, Quesada-Rojas P, Bogantes A, Jiménez VM, Tang H, Zhang J, Wang M-L, Paull RE, Yu Q, Ming R. SunUp and Sunset genomes revealed impact of particle bombardment mediated transformation and domestication history in papaya. 2022 *Nature genetics*, 54(5):715–724. *co-first author

12. Marks RA, Mbobe M, Greyling M, Pretorius J, McLetchie DN, **VanBuren R**, Farrant JM. Variability in Functional Traits along an Environmental Gradient in the South African Resurrection Plant Myrothamnus flabellifolia. 2022 *Plants*, 11(10)

13. R Chávez Montes, Haber A, Pardo J, Powell RF, Divisetty U, Silva AT, Hernandez-Hernandez T, Silveira V, Tang H, Lyons E, Herrera Estrella L, **VanBuren R***, Oliver MJ*. A comparative genomics examination of desiccation tolerance and sensitivity in two sister grass species. 2022 *PNAS,* 119 (5), e2118886119 *corresponding author

14. Marks R, Hotaling S, Frandsen P, **VanBuren R**. Representation and participation across 20 years of plant genome sequencing. 2021 *Nature plants* 7 (12), 1571-1578

15. Pardo J, **VanBuren R***. Evolutionary innovations driving abiotic stress tolerance in C4 grasses and cereals. 2021 *The Plant Cell* 33 (11), 3391-3401. *corresponding author

16. Bird KA, Hardigan MA, Ragsdale AP, Knapp SJ, **VanBuren R**, Edger PP. Diversification, spread, and admixture of octoploid strawberry in the Western Hemisphere. 2021 *American Journal of Botany* 108 (11), 2269-2281

17. Marks RA, Farrant JM, McLetchie DN, **VanBuren R**. Unexplored dimensions of variability in vegetative desiccation tolerance. (2021) *American Journal of Botany* 108 (2), 346-358

18. Hao Y, Mabry ME, Edger PP, Freeling M, Zheng C, Jin L, **VanBuren R**, Colle M, An H, Shawn Abrahams R, Qi X, Barry K, Daum C, Shu S, Schmutz J, Sankoff D, Barker MS, Lyons E, Chris Pires J, Conant GC. The Contributions of the Allopolyploid Parents of the Mesopolyploid Brassiceae are Evolutionarily Distinct but Functionally Compatible. 2021 *Genome Research*, https://doi.org/10.1101/2020.08.10.245258

19. Lou P, Woody S, Greenham K, **VanBuren R**, Colle M, Edger PP, Sartor R, Zheng Y, Levendoski N, Lim J, So C, Stoveken B, Woody T, Zhao J, Shen S, Amasino RM, Robertson McClung C. Genetic and Genomic Resources to Study Natural Variation in Brassica rapa. 2020 *Plant Direct 4 (12), e00285*

20. Chitwood DH, Mullins J, Migicovsky Z, Frank M, **VanBuren R**, Londo. Vein-to-blade ratio is an allometric indicator of climate-induced changes in grapevine leaf size and shape. 2021 *Applications in plant sciences*.

21. Bird KA, Niederhuth C, Ou S, Gehan M, Pires JC, Xiong Z, **VanBuren R**, Edger PP. Replaying the evolutionary tape to investigate subgenome dominance in allopolyploid Brassica napus. 2021 *New Phytologist*. https://doi.org/10.1111/nph.17137

22. Marks RA, Smith J, **VanBuren R**, McLetchie DN. Expression dynamics of dehydration tolerance in the tropical plant Marchantia inflexa. 2021 *The Plant Journal* 105 (1), 209-222.

23. Bryson AE, Brown MW, Mullins J, Dong W, *et al*., **VanBuren R**, Londo J, Chitwood DH. . Composite modeling of leaf shape across shoots discriminates Vitis species better than individual leaves. 2020 *In press American Journal of Botany*, preprint: https://www.biorxiv.org/content/10.1101/2020.06.22.163899

24. Pardo J, Wai CM, Chay H, Madden CF, Hilhorst HWM, Farrant JM, **VanBuren R*** Intertwined signatures of desiccation and drought tolerance in grasses. 2020. *PNAS. 117 (18) 10079-10088* *corresponding author

25. **VanBuren R***, Wai CM, Pardo J, Yocca AE, Wang X, Wang H, Edger PP, Bennetzen JL, Michael T. Subgenome dynamics and stability in the allotetraploid grain crop tef. 2020 *Nature Communications,* 11 (1) 1-11 *corresponding author

26. Michael TP, **VanBuren R**. Building near-complete plant genomes. 2020 *Current Opinion in Plant Biology* 54, 26-33

27. Azodi CB, Pardo J, **VanBuren R**, de los Campos G, Shiu S-H. Transcriptome-based prediction of complex traits in maize. 2020 *The Plant Cell* 32, 139-151

28. Baetsen-Young A, Wai CM, **VanBuren R**, Day B. Fusarium virguliforme Transcriptional Plasticity Is Revealed by Host Colonization of Corn vs. Soybean. 2019 *Plant Cell*, https://doi.org/10.1105/tpc.19.00697

29. Cerbin S, Wai CM, **VanBuren R**, Jiang N. GingerRoot: A Novel DNA Transposon Encoding Integrase-Related Transposase in Plants and Animals. 2019 *Genome Biology and Evolution*, 11(11):3181–3193.

30. Chen L-Y*, **VanBuren R*,** Paris M*, Zhou H, Zhang X, Wai CM, Yan H, Chen S, Alonge M, Ramakrishnan S, et al. The bracteatus pineapple genome and domestication of clonally propagated crops. *Nature Genet*ics doi: 10.1038/s41588-019-0506-8 *co-first authors

31. Wai CM, Weise SE, Ozersky P, Mockler TC, Michael TP, **VanBuren R*.** Time of day and network reprogramming during drought induced CAM photosynthesis in Sedum album. *PLoS Genetics* 2019, 15: e1008209 *corresponding author

32. Edger PP, Poorten TJ, **VanBuren R**, et al. Origin and evolution of the octoploid strawberry genome. *Nature Genetics* 2019, 51: 541–547

33. Dhar N, Short DPG, Mamo BE, Corrion AJ, Wai CM, Anchieta A, **VanBuren R**, Day B, Ajwa H, Subbarao KV, et al. Arabidopsis defense mutant ndr1-1 displays accelerated development and early flowering mediated by the hormone gibberellic acid. 2019 *Plant Sci* 285: 200–213

34. **VanBuren R***, Pardo J, Wai CM, Evans S, Bartels D. Massive tandem proliferation of ELIPs supports convergent evolution of desiccation tolerance across land plants. 2019 *Plant Physiology*, 179: 1040–1049 *corresponding author

35. Colle M, et al. **VanBuren R**, Jiang N, Edger PP. Subgenome dominance and evolution of phytonutrient pathways in allopolyploid blueberry. *GigaScience* 2019, *8* (3), giz012

36. Mower J, Ma PF, Grewe F, Taylor A, Michael TP, **VanBuren R**, Yin-Long Q. Lycophyte plastid genomics: extreme variation in GC, gene and intron content and multiple inversions between a direct and inverted orientation of the rRNA repeat. *New Phytologist* 2019, 22 (2), 1061-1075

37. **VanBuren R***, Wai CM, Keilwagen J, Pard J. A chromosome scale assembly of the model desiccation tolerant grass Oropetium thomaeum. 2018 *Plant direct*, 2 (11). *corresponding author

38. **VanBuren R*,** Wai CM, Pardo J, Giarola V, Ambrosini S, Somg X, Bartels D. Desiccation tolerance evolved through gene duplication and network rewiring in Lindernia. 2018 *Plant cell*, 30 (12), 2943-2958 *corresponding author

39. Zhang J… (114 coauthors), **VanBuren R**, Paterson AH, Nagai C, Ming R. Allele-defined genome of the autopolyploid sugarcane Saccharum spontaneum L. 2018 *Nature genetics*, 50:1565–1573.

40. **VanBuren R***, Wai CM, Colle M, Wang J, Sullivan S, Bushakra JM, Liachko I, Vining KJ, Dossett M, Finn CE, Jibran R. A near complete, chromosome-scale assembly of the black raspberry (Rubus occidentalis) genome. 2018 *GigaScience*, 7(8):giy094. *corresponding author

41. Bushakra JM, Dossett M, Carter KA, Vining KJ, Lee JC, Bryant DW, **VanBuren R**, Lee J, Mockler TC, Finn CE, Bassil NV. Characterization of aphid resistance loci in black raspberry (Rubus occidentalis L.). 2018 *Molecular breeding*, 38(7):83.

42. Bird KA, **VanBuren R**, Puzey JR, Edger PP. The causes and consequences of subgenome dominance in hybrids and recent polyploids. 2018 *New phytologist* 220 (1), 87-93

43. Edger PP, McKain MR, Bird KA, **VanBuren R**. Subgenome assignment in allopolyploids: challenges and future directions. 2018 *Current opinion in plant biol*ogy, 42:76-80.

44. Jibran R, Dzierzon H, Bassil N, Bushakra, JM, Edger P, Sullivan S, Finn CE, Dossett M, Vining, KJ, **VanBuren R**, and Mockler TC. Chromosome-scale scaffolding of the black raspberry (*Rubus occidentalis* L.) genome based on chromatin interaction data. 2018 *Horticulture research*, 5(1), p.8.

45. **VanBuren R***, Wai CM, Ou S, Pardo J, Bryant D, Jiang N, Mockler TC, Edger P, Michael T. Extreme haplotype variation in the desiccation-tolerant clubmoss Selaginella lepidophylla. 2019 *Nature communications*, 9:13. *corresponding author

46. Jibran R, Dzierzon H, Bassil N, Bushakra JM, Edger PP, Sullivan S, Finn CE, Dossett M, Vining KJ, **VanBuren R**: Chromosome-scale scaffolding of the black raspberry (Rubus occidentalis L.) genome based on chromatin interaction data. 2018 *Horticulture research*, 5:8.

47. **VanBuren R***, Wai J, Zhang Q, Song X, Edger PP, Bryant D, Michael TP, Mockler TC, Bartels D: Seed desiccation mechanisms co-opted for vegetative desiccation in the resurrection grass Oropetium thomeaum. 2017 *Plant, cell & environment,* 40 (10), 2292-2306 *corresponding author

48. **VanBuren R**: Desiccation tolerance: Seedy origins of resurrection. 2017 *Nature plants*, 3:17046.

49. Yang X, Hu R, … **VanBuren R**, (33 out of 50 authors) et al. The Kalanchoë genome provides insights into convergent evolution and building blocks of crassulacean acid metabolism. 2018 *Nature communications.* 8: 1899.

50. Edger PP*, **VanBuren R***, Colle M, Poorten TJ, Wai CM, Niederhuth CE, Alger EI, Ou S, Acharya CB, Wang J: Single-molecule sequencing and optical mapping yields an improved genome of woodland strawberry (Fragaria vesca) with chromosome-scale contiguity. 2017 *GigaScience,* 7 (2), gix124 *co-first author

51. Wai CM*, **VanBuren R***, Zhang J, Huang L, Miao W, Edger PP, Yim WC, Priest HD, Meyers BC, Mockler T: Temporal and spatial transcriptomic and microRNA dynamics of CAM photosynthesis in pineapple. 2017 *The plant journal*, *co-first author

Research Grants

Funding Source: NSF-Global Center (OISE-2434687)
Project Title: “Global Centers: International Research Center for Enhancing Plant Resilience”
Period: 01.2025-12.2029
Total costs: $ 5,000,000
Role: Sr. Personnel

Funding Source: NSF-PGRP (IOS-2310355)
Project Title: “RESEARCH-PGR: Predicting Phenotype from Molecular Profiles with Deep Learning: Topological Data Analysis to Address a Grand Challenge in the Plant Sciences”
Period: 07.2023-07.2027
Total costs: $ 639,998.00
Role: co-PI

Funding Source: NSF-BII (DBI-2213983)
Project Title: “BII: Life without water: protecting macromolecules, cells, and organisms during desiccation and rehydration across kingdoms of life”
Period: 08.2022-07.2027
Total costs: $ 12,500,000 (~$1,200,000 to VanBuren)
Role: co-PI

Funding Source: USDA-NIFA AFRI
Project Title: “Identifying the mechanisms controlling stress tolerance in the resilient grain and forage crop teff Eragrostis tef”
Period: 12.2021- 11.2024
Total costs: $ 634,382
Role: PI

Funding Source: NSF-MCB Systems and Synthetic Biology (MCB-1817347)
Project Title: “The origin and genetic architecture of desiccation tolerance in C4 grasses”
Period: 8.2018- 7.2023
Total costs: $720,000
Role: PI

Funding Source: NIH-T32
Project Title: “Plant Biotechnology for Health and Sustainability”
Period: 09.2024-08.2029
Total costs: $ 1,974,057
Role: co-PI

Funding Source: NSF-NRT (NRT-1828149)
Project Title: “Intersecting computational and data science to address grand challenges in plant biology”
Period: 9.2018- 8.2024
Total costs: $ 2,999,967
Role: co-PI

Scientific Leadership

Ad-hoc manuscript reviewer (since August 2020):

Nature (3), Nature Genetics (6), Nature Food (1), Nature Plants (10), Nature Communications (12), Nature Reviews Genetics (1), PNAS (2), Science Advances (1), Communications Biology (2), Giga Science (2), Physiologia Plantarum (1), The Plant Cell (6), Plant Physiology (4), Plant Journal (7), Plant Cell & Environment (3), Plant and Cell Physiology (1), Molecular Plant (2), Planta (11), PloS ONE (2), Peer J (4), Theoretical and Applied Genetics (1), BMC Genomics (2), BMC Plant Biology (2), Tropical Plant Biology (1). Frontiers in Plant Science (8), Genes (1), Agronomy (1), Physiology and Molecular Biology of Plants (1), New Phytologist (3), Crop and Pasture Science, Hort Research (2), Plant Direct (2), Functional Plant Biology (1), Cogent Food & Agriculture (1), Ecology and Evolution (1)

Review and Editorial service:

2016-present Peer J (handling editor)
2017-present Planta (editorial board member)

Ad-hoc reviewer for the following granting agencies:

2022 National Science Foundation (USA)

2021 National Science Foundation (USA)
2020 National Science Foundation (USA)
2020 National Research Foundation (South Africa)
2019 National Science Foundation (USA)
2018 National Science Foundation (USA)
2018 JGI-CSP (USA), panelist
2017 ERA-NET Coordinating Action in Plant Sciences (ERA-CAPS; Europe)

Invited talks and lectures

2024 Mockler distinguished lecture, Donald Danforth Plant Science Center. December 2024. St. Louis MO.

2024 University of Missouri. April 2024. Columbia MO.

2024 Keynote Lecture International Workshop on Desiccation Sensitivity and Tolerance across Life Forms. January 2024. Johannesburg, South Africa.

2024 Discussion Leader, Gordon Research Conference on Salt and Water Stress in Plants, August 2024.

2023 Symposium on Crop Resilience. University of Bern. May 2023. Bern, Swizterland.
2023 Guest to the US Embassy in Bulgaria and American College of Sofia. "Next generation Genome Technologies and Plant Resilience" September 2023. Sofia, Bulgaria.

2022 Heinrich Heine University Düsseldorf, 'Leveraging evolutionary innovations to develop climate resilient agriculture' October 2022, Düsseldorf, Germany

2022 Royal Society meeting, 'Convergent evolution of desiccation tolerance' March 2022, London UK

2021 International Conference on Plant Systems Biology and Biotechnology, 'Systems biology of desiccation tolerance in resurrection plants' June 2021, Golden Sands, Bulgaria.

2021 Heinrich Heine University Düsseldorf, 'Convergent evolution of desiccation tolerance' May 3 2021, Düsseldorf, Germany

2021 University of Nebraska, 'Leveraging evolutionary innovations to develop climate resilient agriculture' October 2022, Lincoln Nebraska.

2019 University of Bonn. April 2019. Bonn, Germany.

2019 Botany Conference. 'Origins of desiccation tolerance in land plants'. July 2019, Tuscon AZ.

2019 Plant Genome Evolution. 'Comparative genomics of desiccation tolerance'. September 2019. Sitges, Spain.

2019 Great Lakes Plant Breeding Initiative. 'The Genetics of Drought and Desiccation Tolerance in C4 Grasses' June 26 2019. East Lansing, MI.