




DOUGLAS SPONSLER

EDUCATION

- 2016 • **The Ohio State University**
Ph.D. in Entomology  Columbus, Ohio, USA
- 2010 • **Cedarville University**
B.S. in Biology  Cedarville, Ohio, USA

PROFESSIONAL EXPERIENCE

- 2020
|
present • **Postdoctoral Researcher**
Department of Animal Ecology and Tropical Biology, University of Würzburg  Würzburg, Germany
- Lead pollinator competition module of EU Project Safeguard
 - Lead study of bumble- bee-wildflower interactions in Berchtesgadener Alps
 - Mentor Ph.D. and MS students
 - Provide statistical support to students and colleagues
 - Organize department seminar program
 - Contribute to classroom- and field-based teaching
- 2018
|
2021 • **Research Associate**
The Academy of Natural Sciences of Drexel University  Philadelphia, PA, USA
- Lead study of urban plant-pollinator ecology in Philadelphia
 - Communicate research to museum visitors
- 2017
|
2020 • **Postdoctoral Fellow**
Pennsylvania State University  University Park, PA, USA
- Design, conduct, and analyze USDA-NIFA-funded field studies of honey bee colony health
 - Lead an NSF-funded multi-institutional working group in the development of a framework for understanding pesticide effects on pollinators
 - Extend research to beekeeper and master gardener organizations
 - Contribute to classroom- and field-based teaching

PEER-REVIEWED PUBLICATIONS

- 2023 • **Distance functions underlying natural enemy within-field distributions: assessing the effects of crop type and adjacent habitats**
(Submitted to *Nature Ecology and Evolution*)
Boetzel FA, Sponsler DB, et al.

CONTACT INFO

Department of Animal Ecology and Tropical Biology

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 [Google Scholar](#)

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INTERESTS

Flower-insect interactions

Bayesian modeling

Causal inference

Urban ecology

Human-nature interactions

Natural history

LANGUAGES

English (native)

German (B1 / early intermediate)

- 2023 ● **Pollinator competition and the structure of floral resources**
(in-revision at *Ecography*)
Sponsler DB, Iverson AL, Steffan-Dewenter I
- 2022 ● **Grassy-herbaceous land moderates regional climate effects on honey bee colonies in the Northcentral U.S.**
Environmental Research Letters 17;064036
Quinlan G, Sponsler DB, Gaines-Day HR, McMinin-Sauder HBG, Otto CRV, Smart AH, Colin T, Gratton C, Isaacs R, Johnson R, Milbrath MO, Grozinger CM
- 2022 ● **Contrasting patterns of richness, abundance, and turnover in mountain bumble bees and their floral hosts**
Ecology 2022;e3712
Sponsler DB, Requier F, Kallnik K, Claßen A, Maihoff AF, Sieger J, Steffan-Dewenter I
- 2022 ● **Floral preferences of mountain bumble bees are constrained by functional traits but flexible through elevation and season**
Oikos 2022;3:e08902
Sponsler DB, Requier F, Kallnik K, Claßen A, Maihoff AF, Sieger J, Steffan-Dewenter I
- 2021: ● **Beekeeping in, of, or for the city? A socioecological analysis of urban apiculture in the United States.**
People and Nature 2021;3:550-559
Sponsler DB, Bratman EZ
- 2021: ● **Honey bees and neonicotinoid-treated corn seed: contamination, exposure, and effects**
Environmental Toxicology and Chemistry 2021;40:1212-1221
Lin C-H, Sponsler DB, Richardson RT, Watters H, Glinski D, Henderson M, Minucci J, Lee EH, Purucker T, Johnson RM.
- 2021: ● **Application of plant metabarcoding to identify diverse honeybee pollen forage along an urban-agricultural gradient**
Molecular Ecology 2021;30:310-323
Richardson RT, Eaton T, Lin C-H, Cherry G, Johnson RM, Sponsler DB
- 2020: ● **Characterizing the floral resources of a North American metropolis using a honey bee foraging assay**
Ecosphere 2020;e03102
Sponsler DB, Shump D, Richardson RT, Grozinger CM
- 2020: ● **A screening-level assessment of the pollinator-attractiveness of ornamental nursery stock using a honey bee foraging assay**
Scientific Reports 2020;10:831
Sponsler DB, Grozinger CM, Richardson RT, Nurse A, Brough D, Patch H, Stoner K
- 2020: ● **County-level analysis reveals a rapidly shifting landscape of bee toxic load on US farmland**
Scientific Reports 2020;10:797
Douglas MR, Sponsler DB, Lonsdorf EV, Grozinger CM

- 2020: ● **MetaCurator: A hidden Markov model-based toolkit for extracting and curating sequences from taxonomically-informative genetic markers**
Methods in Ecology and Evolution 2020;11:181-186
Richardson RT, **Sponsler DB**, McMinn-Sauder H, Johnson RM
- 2019: ● **Pesticides and pollinators: a socioecological synthesis.**
Science of the Total Environment 2019;662:1012-1027
Sponsler DB, Grozinger CM, Hitaj C, Rundlöf M, Botías C, Code A, Lonsdorf EV, Melathopoulos AP, Smith DJ, Suryanaryanan S, Thogmartin WE, Williams NM, Zhang M, Douglas MR
- 2019: ● **Quantitative multi-locus metabarcoding and waggle dance interpretation reveal honey bee spring foraging patterns in Midwest agroecosystems**
Molecular Ecology 2019;28:686-697
Richardson RT, Curtis HR, Matcham EG, Lin C-H, Suresh S, **Sponsler DB**, Hearon LE, Johnson RM
- 2017: ● **Spatial and taxonomic patterns of honey bee foraging: a choice test between urban and agricultural landscapes**
Journal of Urban Ecology 2017;3:1-7
Sponsler DB, Matcham EG, Lin C-H, Lanterman JL, Johnson RM
- 2017: ● **Mechanistic modeling of honey bee pesticide exposure: the missing keystone of honey bee toxicology**
Toxicology and Chemistry 2017;36:871-881
Sponsler DB, Johnson RM
- 2015: ● **Honey bee success predicted by landscape composition in Ohio, USA**
PeerJ 2015;3:e838.
Sponsler DB, Johnson RM
- 2015: ● **Application of ITS2 metabarcoding to determine the provenance of pollen collected by honey bees in an agroecosystem**
Applications in Plant Sciences 2015;3:1400066
Richardson RT, Lin C-H, **Sponsler DB**, Quijia-Pillajo JO, Goodell K, Johnson RM



POPULAR PUBLICATIONS

- 2017: ● **Poisoning a society: a superorganism perspective on honey bee toxicology**
Bee World 2017;95:30-32.
Sponsler DB, Johnson RM
- 2015: ● **Honey bee success in Ohio's landscapes**
Ohio Beekeeping 2015;4:26-27.
Sponsler DB
- 2014: ● **Honey bee losses and toxic corn seed dust.**
Ohio Beekeeping 2014;3:11-23.
Sponsler DB, Lin C-H, Johnson RM



GRANTS

- 2020: ● **Establishing the Penn State honey diagnostics lab to serve Pennsylvania beekeepers (\$47,797)**
Pennsylvania Commonwealth Specialty Crop Block Grant.
Grozinger CM, Sponsler DB
- 2018: ● **Strengthening urban apiculture, crop production, and biodiversity by understanding the habitat needs of wild and managed bees (\$163,00)**
USDA-NIFA-AFRI Postdoctoral Fellowship
Sponsler DB, Grozinger CM
- 2017: ● **Location, location, location: developing tools for selection and management of landscapes to promote healthy bee populations (\$9,777)**
North American Pollinator Protection Campaign
Jones TO, Lonsdorf E, Douglas M, Grozinger C, Patch H, Sponsler DB
- 2017: ● **Impact of urban landscapes on honey bee nutritional resources: a pilot study (\$6,037)**
Apes Valentes
Sponsler DB, Grozinger CM
- 2015: ● **An Ohio pollen database (\$2,500)**
Ohio State Beekeepers' Association
Sponsler DB, Lin C-H, Richardson RT, Wransky M, Johnson RM
- 2014: ● **Honey bee nutrition in the Midwestern landscape: assessing pollen diversity and nutrition along an urban-rural gradient in central Ohio (\$2,990)**
Ohio Agricultural Research and Development Center SEEDS Program
Sponsler DB, Johnson RM
- 2013: ● **Development of a portable hive scale (\$2,000)**
Ohio State Beekeepers' Association
Sponsler DB, Johnson RM
- 2012: ● **Honey bee success in urban and rural landscapes (\$2,478)**
Ohio State Beekeepers' Association
Sponsler DB, Johnson RM



FELLOWSHIPS AND AWARDS

- 2018: ● **Environmental Toxicology and Chemistry Best Paper**

Society for Environmental Toxicology and Chemistry
- 2016: ● **Ray Travel Award**

The Ohio State University

- 2016: ● **Foundation Scholarship**
The Foundation for the Preservation of Honey Bees
- 2014: ● **President's Prize runner up (10-min paper)**
Entomological Society of America
- 2014: ● **James E. Tew Extension Award**
The Ohio State University
- 2012: ● **President's Prize (10-min paper)**
Entomological Society of America
- 2014: ● **Director's Fellowship**
The Ohio Agricultural Research and Development Center



MENTORING

- 2022 ● **MS mentor**
Co-mentor of Jessica Strehl. 📍 University of Würzburg, Würzburg, Germany
- 2022 ● **MS mentor**
Co-mentor of Murray Hamilton. 📍 University of Würzburg, Würzburg, Germany
- 2022 | present ● **Ph.D. mentor**
External committee member for Austin Martin. 📍 Temple University, Philadelphia, PA
- 2021 | present ● **Ph.D. mentor**
Co-advisor of Giulia Mainardi. 📍 University of Würzburg, Würzburg, Germany
- 2017 | 2018 ● **Undergraduate mentor**
Supervised undergraduate research Dalton Brough. 📍 Penn State University, University Park, PA
- 2014 | 2015 ● **Science Olympiad coach (NSF GK-12)**
📍 Orrville Middle School, Orrville, OH



COURSE INSTRUCTION

- 2016 ● **Pesticides and their Use**
Developed and taught course 📍 Ohio Agricultural Technical Institute, Wooster, OH
- 2016 ● **General Entomology**
Lab instructor 📍 Ohio Agricultural Technical Institute, Wooster, OH
- 2014 ● **Philosophy of Science**
Visiting instructor 📍 Central Christian High School, Kidron, OH

2012 ● **Energy Transfer and Development**
Graduate Teaching Assistant
📍 The Ohio State University, Columbus, OH



GUEST LECTURES

2023 ● **Interdepartmental Ring Lecture (Ecology and Time)**
📍 University of Würzburg, Würzburg, Germany

2020 |
2022 ● **Honey Bee Ecology**
📍 University of Würzburg, Würzburg, Germany

2021 ● **Animal Pollinators**
📍 University of Würzburg, Würzburg, Germany

2020 |
2023 ● **R Club (GAMs, Writing in RMarkdown, Causal Inference)**
📍 University of Würzburg, Würzburg, Germany

2019 ● **Pollination Ecology**
📍 California State University Fresno, Fresno, CA

2019 ● **Urban Ecology**
📍 PA Master Naturalist Program, Philadelphia, PA

2019 ● **Introduction to Ecology**
📍 PA Master Naturalist Program, Philadelphia, PA

2019 ● **Plant-Animal Interactions**
📍 Drexel University, Philadelphia, PA

2018 ● **Advances in Ecology**
📍 Pennsylvania State University, State College, PA

2018 ● **Pollinators in Designed Greenspace**
📍 Pennsylvania State University, State College, PA

2018 ● **Urban Pollinator Ecology**
📍 Dickinson College, Carlisle, PA.

2017 ● **Honey Bees and Humans**
📍 Pennsylvania State University, State College, PA

2013 |
2015 ● **Beekeeping**
📍 The Ohio State University, Columbus, OH



INVITED PRESENTATIONS

2023: ● **Gardens as pollinator habitat: limitations, potential, and context**
New Directions in the American Landscape (NDAL) annual symposium (to be given 14 Mar 2023)
📍 Philadelphia, PA (virtual)
Sponsler DB

2022: ● **Flowers are food, pollinators are florivores, and what we're doing here is trophic ecology.**
Protecting Pollinators in Urban Landscapes Conference (11 Oct 2022)
📍 Athens, GA (virtual)
Sponsler DB

- 2022: ● **Flowers, insects, and people: stewarding an ancient mutualism through greenspace design**
New Directions in the American Landscape (NDAL) annual symposium (27 Jan 2022) 📍 Philadelphia, PA (virtual)
Sponsler DB
- 2022: ● **Pollinator competition and the structure of floral resources**
Lund University (28 Oct 2021) 📍 Lund, Sweden (virtual)
Sponsler DB
- 2021: ● **Mountain bumble bees and wildflowers exhibit nonlinear patterns of abundance and β -diversity, punctuated by the tree line ecotone**
Naturalis Biodiversity Center (19 Apr 2021) 📍 Leiden, Netherlands (virtual)
Sponsler DB
- 2020: ● **Landscape-scale flow/dearth monitoring: a robust method for messy data**
4th International Conference on Bee and Hive Monitoring (8 Oct 2020) 📍 Missoula, Montana (virtual)
Sponsler DB
- 2019: ● **Landscape anthecology: a paradigm, a toolkit, and an application**
American Entomological Society (4 Dec 2019) 📍 Philadelphia, PA
Sponsler DB
- 2019: ● **Floral resource topography of a North American metropolis revealed by honey bee foraging assay**
The Academy of Natural Sciences of Drexel University (15 Nov 2019) 📍 Philadelphia, PA
Sponsler DB
- 2019: ● **Floral resource topography of a North American metropolis revealed by honey bee foraging assay**
International Conference for Pollinator Biology (20 Jul 2019) 📍 Davis, CA
Sponsler DB, Shump D, Richardson RT, Grozinger CM.
- 2018: ● **Honey bee foraging in the City of Neighborhoods: Two years of colony weight monitoring reveal spatial and temporal patterns of floral availability**
Entomological Society of America (14 Nov 2018) 📍 Vancouver, Canada
Sponsler DB, Shump D, Grozinger CM
- 2018: ● **Plants, pollinators, and people in the City of Neighborhoods**
Drexel University (27 Sep 2018) 📍 Philadelphia, PA
Sponsler DB
- 2018: ● **Honey bee foraging patterns and colony weight dynamics reveal ecological heterogeneity of urban landscape**
Entomological Society of America, Eastern Branch (19 Mar 2018) 📍 Annapolis, MD
Sponsler DB, Shump D, Grozinger CM
- 2018: ● **Flying needles in a landscape-scale haystack: the challenge of observing foraging bees**
International Society for Optics and Photonics (SPIE), Penn State student chapter (1 Feb 2018) 📍 University Park, PA
Sponsler DB

- 2018: ● **Bees, flowers, and people in “The City of Neighborhoods”**
Franklin and Marshall University (26 Jan 2018) 📍 Lancaster, PA
Sponsler DB
- 2017: ● **Bees and the urban food scene**
Entomological Society of America (8 Nov 2017) 📍 Devner, CO
Sponsler DB, Shump D, Patch HM, Grozinger CM
- 2017: ● **Honey bee landscape ecology**
Bucks County Community College, first annual science seminar (19 May 2017) 📍 Newtown, PA
Sponsler DB
- 2017: ● **Integrating landscape and behavior to predict honey bee pesticide exposure**
Eastern Branch of the Entomological Society of America (20 Mar 2017) 📍 Newport, RI
Sponsler DB
- 2016: ● **Integrating landscape and behavior to predict honey bee pesticide exposure**
Workshop on pollinator ecosystem services, Penn State University (20 Dec 2016) 📍 State College, PA
Sponsler DB
- 2016: ● **Honey bee landscape ecology: foraging, toxic exposure, and apicultural outcomes**
Miami University of Ohio (4 Dec 2016) 📍 Miami, OH
Sponsler DB
- 2016: ● **Urban vs. rural beekeeping: the proof is in**
TriCounty Beekeepers' Association Annual Spring Workshop (5 Mar 2016) 📍 Wooster, OH
Sponsler DB, Matcham EG, Lin C-H, Johnson RM



OUTREACH PROGRAMMING

- 2020 ● **Museum Exhibitor**
Hosted an exhibit of bees diversity for Martin Luther King, Jr Day event.
📍 The Academy of Natural Sciences of Drexel University, Philadelphia, PA
- 2019 ● **Workshop Instructor**
Led live honey bee dance decoding activity for museum visitors during the annual BugFest event.
📍 The Academy of Natural Sciences of Drexel University,, Philadelphia, PA
- 2019 ● **Workshop Instructor**
Five-day USDA-PDSTEP workshop (APPL-RED) training middle and high school teachers to develop project-based lessons on plant-pollinator interactions
📍 Penn State University, University Park, PA
- 2019 ● **Workshop Instructor**
Workshop for urban gardeners and farmers to build nests for stem-nesting wild bees.
📍 Philadelphia Beekeepers Guild, Philadelphia, PA
- 2019 ● **Workshop Instructor**
Workshop for urban gardeners and farmers to build nests for stem-nesting wild bees.
📍 Awbury Arboretum, Philadelphia, PA
- 2019 ● **Workshop Instructor**
Workshop for urban gardeners and farmers to build nests for stem-nesting wild bees.
📍 Penn State Center, Philadelphia, PA

- 2017 ● **Workshop Instructor**
Five-day USDA-PDSTEP workshop (APPL-RED) training middle and high school teachers to develop project-based lessons on plant-pollinator interactions
📍 Penn State University, University Park, PA
- 2015 | 2016 ● **Workshop Instructor**
Led field trips to the OSU Department of Entomology for preschool, elementary, and middle school students from Wooster Summer Camp and the Montessori School of Wooster.
📍 Ohio State University, Wooster, OH
- 2015 ● **Workshop Instructor**
Co-led stream macroinvertebrate workshop for children at the Family Farm Field Day agricultural fair
📍 Holmes County, OH
- 2014 ● **Workshop Instructor**
Taught microscopy techniques for monitoring Nosema infection in honey bees 📍 Ohio State University, Wooster, OH
- 2013 ● **Workshop Instructor**
Curated, displayed, and discussed bee specimens at the Power of Pollinators short course.
📍 Ohio State University, Wooster, OH



SELECTED OUTREACH PRESENTATIONS

- 2019: ● **The world's best forager vs. the world's most complicated landscape: Three years of studying honey bee foraging in Philadelphia**
Barnstable Beekeepers Association (16 Sep 2019) 📍 Barnstable, MA (virtual)
Sponsler DB
- 2019: ● **Bees, brews, and brotherly love: the avant garde ecology of Philadelphia**
Science on Tap, National Mechanics Pub (12 May 2019) 📍 Philadelphia, PA
Sponsler DB
- 2019: ● **Bees and urban flora: exploring the trophic ecology of ornamentals, remnants, and "weeds" in the city**
Philadelphia Botanical Club (28 Feb 2019) 📍 Philadelphia, PA
Sponsler DB
- 2019: ● **The evolving science and policy of pesticides and pollinators**
Pennsylvania Agronomy Education Conference (17 Jan 2019) 📍 Boalsburg, PA
Sponsler DB
- 2019: ● **Integrated tools for honey bee landscape ecology**
American Honey Producers Association (11 Jan 2019) 📍 Tempe, AZ
Sponsler DB
- 2018: ● **What is the place of bees and beekeepers in the ecology of the city?**
Philadelphia Honey Festival (9 Sep 2018) 📍 Tempe, AZ
Sponsler DB
- 2018: ● **Bees, flowers, and people in "The City of Neighborhoods"**
Philadelphia Beekeepers' Guild (19 Apr 2018) 📍 Philadelphia, PA
Sponsler DB

- 2017: ● **Bees and the Philly food scene**
Philadelphia Beekeepers' Guild (18 May 2017) 📍 Philadelphia, PA
Sponsler DB
- 2017: ● **Honey bee landscape ecology**
Mountain State Beekeepers' Association (1 May 2017) 📍 Kearneysville, WV
Sponsler DB
- 2017: ● **Honey bees and pesticides**
Champlaine Valley Beekeepers' Association (29 Apr 2017) 📍 Beekmantown, NY
Sponsler DB
- 2016: ● **Honey bee foraging in Ohio's landscapes**
TriCounty Beekeepers' Association (31 Aug 2016) 📍 Wooster, OH
Sponsler DB
- 2016: ● **Honey bee landscape ecology**
American Beekeeping Federation (7 Jan 2016) 📍 Jacksonville, FL
Sponsler DB
- 2014: ● **Predatory flies**
Secret Lives of Good Garden Bugs Workshop (15 May 2014) 📍 Cleveland, OH
Sponsler DB
- 2014: ● **So, how are the bees? Complexity, confusion, and consensus in the world of honey bee health**
Cucumber Growers' Meeting, Ohio Agricultural Research and Development Center (25 Mar 2014) 📍 Fremont, OH
Sponsler DB
- 2013: ● **Honey bee geography: why thinking outside the box might be the key to helping honey bees**
OARDC Staff Advisory Council (22 Oct 2013) 📍 Fremont, OH
Sponsler DB
- 2013: ● **Honey bee health, colony collapse disorder, and why it matters**
Congressional Assistants' tour of OARDC (16 Aug 2013) 📍 Wooster, OH
Sponsler DB
- 2013: ● **An introduction to bee diversity and natural history**
Master Gardener Pollinator Training Workshop (22 Jun 2013) 📍 Wooster, OH
Sponsler DB



PROFESSIONAL TRAINING

- 2022: ● **Data management**
5-day short course on research data management 📍 German Ecological Society (GfÖ), virtual meeting
- 2018: ● **Open Source Geospatial Data Analysis**
3-day short course on geospatial data analysis with R and Python 📍 Socioecological Synthesis Center (SESYNC), Annapolis, MD

- 2016: ● **REACH suicide prevention training**
Workshop on suicide prevention, designed especially for professors working with undergraduate students
📍 The Ohio State University, Columbus, OH
- 2016: ● **Introduction to individual-based/agent-based modelling**
Two-day workshop taught by Volker Grimm, Nika Galic, and Michael Crawford
📍 Towson, MD
- 2016: ● **Diversity and implicit bias awareness training**
Three-day workshop on mitigating implicit bias, promoting diversity, and aiding distressed individuals
📍 The Ohio State University, Columbus, OH
- 2011: ● **Native bee identification, ecology, research, and monitoring**
Five-day course workshop taught by Sam Droege, Alana Taylor, and Rob Jean
📍 National Conservation Training Center, Shepherdstown, WV



SERVICE

- 2022
|
present ● **Equal Opportunity Committee Member**
Project Safeguard, European Union Research Consortium
- 2020
|
present ● **Seminar coordinator**
Department of Animal Ecology and Tropical Biology of the University of Würzburg
- 2019
|
present ● **Executive committee member**
Philadelphia Botanical Club
- 2019 ● **Diversity and inclusion panel member**
Penn State University, Department of Entomology
- 2018 ● **Student competition judge**
Entomological Society of America and the Society for Environmental Toxicology and Chemistry
- 2017 ● **Activity leader, Great Insect Fair**
Penn State University, Department of Entomology
- 2014
|
2015 ● **Faculty hiring committee member**
The Ohio State University, Department of Entomology
- 2014
|
2015 ● **Summer Research Opportunities Program (SROP) panel member**
The Ohio State University, Department of Entomology
- 2013
|
2015 ● **Treasurer, Entomology Graduate Student Association**
The Ohio State University, Department of Entomology
- 2011 ● **Volunteer curatorial assistant**
The Academy of Natural Science, Philadelphia, PA.
- 2009 ● **President, ProTerraForma.**
Student conservation club, Cedarville University



SKILLS

- **R statistical software**

- **Directed acyclic graphs and causal inference**
- **Bayesian data analysis**
- **Multivariate statistics**
- **Geographic Information Systems (GIS)**
- **Graphic design and image processing (Inkscape, GIMP)**
- **Beekeeping**
- **DNA metabarcoding**
- **Microscopy**



GRANT REVIEWING

- 2022 ● **European Partnership Biodiversa+**
- 2021 ● **Estonian Research Council**
- 2019 ● **USDA National Institute of Food and Agriculture (USDA-NIFA)**
- 2014 ● **SEEDS, an intramural funding program of the Ohio State University College of Food, Agriculture, and Environmental Science.**



MANUSCRIPT REVIEWING

- **Apidologie**
- **Agricultural and Forest Entomology**
- **Behavioral Ecology and Sociobiology**
- **Biology**
- **Ecology and Evolution**

- **Ecosphere**
- **Ecological Applications**
- **Frontiers in Ecology and Evolution**
- **Insects**
- **Insect Conservation and Diversity**
- **Journal of Applied Ecology**
- **Journal of Ecology**
- **Journal of Economic Entomology**
- **Journal of Visualized Experiments**
- **Molecular Ecology**
- **Oecologia**
- **Oikos**
- **PeerJ**
- **Scientific Reports**
- **Urban Forestry and Urban Greening**