

Eric L. Patterson

Assistant Professor

Michigan State University, Department of Plant, Soil, and Microbial Sciences
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DEGREES

PhD, Bioagricultural Sciences, Weed Science. Colorado State University. 2018

Dissertation: “The Genetics and Genomics of Herbicide Resistant *Kochia scoparia*”

MS, Botany. Colorado State University. 2013.

Thesis: “Analyzing Genetic Response Mechanisms Associated with Copper Homeostasis in *Populus trichocarpa* using a Bioinformatics Approach”

BS, Evolutionary Biology; BS, Zoology. Colorado State University. 2009.

AREAS OF SCIENTIFIC EXPERTISE

Herbicide Resistance – Herbicide resistance is an important problem facing farms globally, and I believe that using genomic and molecular biology to understand the fundamentals of herbicide resistance is essential for the continued longevity of modern agriculture.

Herbicide Resistance Evolution – Herbicide resistance is an elegant example of “evolution in action” and understanding the genetics driving this evolution is a key component of weed molecular biology.

Diagnostic Marker Development – Developing molecular markers for rapid diagnostics of field problems is an essential service to provide to growers. Specifically, I am interested in detecting herbicide resistance before application and detecting gene flow between population or species.

Genome Rearrangements and Structure – Gene duplication and genome re-arrangements have repeatedly been shown as important sources of genetic variation and have the potential to have profound impacts on gene expression and phenotype. Understanding the causes and results of these events is essential for understanding adaptive evolution on short time scales.

PROFESSIONAL EXPERIENCE

August 2019 – Present: Assistant Professor in The Department of Plant, Soil, and Microbial Sciences, Michigan State University.

June 2018 – August 2019: Post-Doctoral Researcher and Clemson Research Fellow under the supervision of Dr. Chris Sasaki at Clemson University

February 2014 – July 2018: Research Associate III under the supervision of Dr. Todd Gaines at Colorado State University:

August 2014 - May 2016. Biology Instructor under the supervision of Dr. Lynne Fox-Parrish at Aims Community College:

STATISTICS

Google Scholar Accessed 06/28/22

h-Index: 16

i10-Index: 20

Citations: 773

PUBLICATIONS

1. Marcelo R. A. de Figueiredo, Anita Küpper, Jenna M. Malone, Tijana Petrovic, Ana Beatriz T. B. de Figueiredo, Grace Campagnola, Olve B. Peersen, Kasavajhala V.S.K. Prasad, **Eric L. Patterson**, Anireddy S.N. Reddy, Martin F. Kubeš, Richard Napier, Franck E. Dayan, Christopher Preston, and Todd A. Gaines. "An in-frame deletion in the degron tail of auxin coreceptor *IAA2* confers resistance to the herbicide 2,4-D in *Sisymbrium orientale*." *Proceedings of the National Academy of Sciences*, 119, no. 00 (2022): e2105819119.
2. Greta C Gallina, Bert M Cregg, **Eric L Patterson**, Debalina Saha. "A Review of Chemical Weed Control Practices in Christmas Tree Production." *Forests*, 13, no. 2 (2022):250
3. Chen, Jinyi, Qin Yu, Mechelle Owen, Heping Han, **Eric L. Patterson**, Chad Sayer, and Stephen Powles. "Target-site resistance to trifluralin is more prevalent in annual ryegrass populations from Western Australia." *Pest management science*, 78, no. 3 (2022): 1206-1212.
4. Ravet, Karl, Crystal D. Sparks, Andrea L. Dixon, Anita Küpper, Eric P. Westra, Dean J. Pettinga, Patrick J. Tranel et al. "Genomic-based epidemiology reveals independent origins and gene flow of glyphosate resistance in *Bassia scoparia* populations across North America." *Molecular ecology*, 30, no. 21 (2021): 5343-5359.
5. Matthew T. Elmore, Katherine H. Diehl, Rong Di, Jinyi Chen, **Eric L. Patterson**, James T. Brosnan, Robert N. Trigiano, Daniel P. Tuck, Sarah L. Boggess, Steven McDonald "Identification of Two *Eleusine indica* (Goosegrass) Biotypes of Cool-Season Turfgrass Resistant to Dithiopyr." *Pest management science*, 78, no. 2 (2021): 499-505.
6. Laforest, Martin, Brahim Soufiane, **Eric L. Patterson**, José J. Vargas, Sarah L. Boggess, Logan C. Houston, Robert N. Trigiano, and James T. Brosnan. "Differential Expression of Genes Associated with Non-Target Site Resistance in *Poa Annua* with Target Site Resistance to Acetolactate Synthase Inhibitors." *Pest management science*, 77, no. 11 (2021): 4993-5000.
7. Chen, Jinyi, Qin Yu, **Eric L. Patterson**, Chad Sayer, and Stephen Powles. "Dinitroaniline Herbicide Resistance and Mechanisms in Weeds." *Frontiers in Plant Science*, 12 (2021): 507.
8. Schramski, John A., Christy L. Sprague, and **Eric L. Patterson**. "Environmental cues affecting horseweed (*Conyza canadensis*) growth types and their sensitivity to glyphosate." *Weed Science*, (2021): 1-10.
9. Brusa, Anthony, **Eric L. Patterson**, Todd A. Gaines, Kevin Dorn, Philip Westra, Crystal D. Sparks, and Don Wyse. "A needle in a seedstack: An improved method for detection of rare alleles in bulk seed testing through KASP." *Pest management science*, 77, no. 5 (2021): 2477-2484.
10. Chen, Jinyi, Erin Burns, Margaret Fleming, and **Eric L. Patterson**. "Impact of Climate Change on Population Dynamics and Herbicide Resistance in Kochia (*Bassia scoparia* (L.) AJ Scott)." *Agronomy*, 10, no. 11 (2020): 1700.
11. Chen, Jinyi, Zhizhan Chu, Heping Han, **Eric L. Patterson**, Qin Yu, and Stephen Powles. "Diversity of α -tubulin transcripts in *Lolium rigidum*." *Pest Management Science*, 77(2), 970-977.

12. Giacomini, Darci A., **Eric L. Patterson**, Anita Küpper, Roland Beffa, Todd A. Gaines, and Patrick J. Tranel. "Coexpression Clusters and Allele-Specific Expression in Metabolism-Based Herbicide Resistance." *Genome biology and evolution*, 12, no. 12 (2020): 2267-2278.
13. Montgomery, Jacob S., Darci Giacomini, Bridgit Waithaka, Christa Lanz, Brent P. Murphy, Ruth Campe, Jens Lerchl, Andreas Landes, Fanny Gatzmann, Antoine Janssen, Rudie Antonise, **Eric L. Patterson**, Detlef Weigel, Patrick J Tranel. "Draft Genomes of *Amaranthus tuberculatus*, *Amaranthus hybridus*, and *Amaranthus palmeri*." *Genome Biology and Evolution*, 12, no. 11 (2020): 1988-1993.
14. Molin, William T., **Eric L. Patterson**, and Christopher A. Saski. "Homogeneity among glyphosate-resistant *Amaranthus palmeri* in geographically distant locations." *Plos one*, 15, no. 9 (2020).
15. Brosnan, James T., José J. Vargas, Bruce Spesard, Derek Netzband, John M. Zobel, Jinyi Chen, and **Eric L. Patterson**. "Annual bluegrass (*Poa annua*) resistance to indaziflam applied early-postemergence." *Pest management science*, 76, no. 6 (2020): 2049-2057.
16. **Eric L Patterson**, Christopher Saski, Anita Küpper, Roland Beffa, and Todd A. Gaines. "Omics Potential in Herbicide-Resistant Weed Management." *Plants*, 8, no. 12 (2019): 607.
17. **Eric L Patterson**, Christopher A Saski, Daniel B Sloan, Patrick J Tranel, Philip Westra, Todd A Gaines. "The Draft Genome of *Kochia scoparia* and the Mechanism of Glyphosate Resistance via Transposon-Mediated EPSPS Tandem Gene Duplication." *Genome Biology and Evolution*, 11, no. 10 (2019) 2927-2940.
18. Debalin Sarangi, Trey Stephens, Abigail L. Barker, **Eric L. Patterson**, Todd A. Gaines, and Amit J. Jhala. "Protoporphyrinogen oxidase (PPO) inhibitor-resistant waterhemp (*Amaranthus tuberculatus*) from Nebraska is multiple herbicide resistant: confirmation, mechanism of resistance, and management." *Weed Science*, 67, no. 5 (2019): 510-520.
19. Hudson K Takano, **Eric L. Patterson**, Scott J. Nissen, Franck E. Dayan, and Todd A. Gaines. "Predicting herbicide movement across semi-permeable membranes using three phase partitioning." *Pesticide Biochemistry and Physiology*, 159 (2019) 22-26.
20. Gaines, Todd A., **Eric L. Patterson**, and Paul Neve. "Molecular mechanisms of adaptive evolution revealed by global selection for glyphosate resistance." *New Phytologist*, 223.4 (2019): 1770-1775.
21. Maxwell C. Oliveira, Todd A. Gaines, **Eric L. Patterson**, Amit J. Jhala, Suat Irmak, Keenan Amundsen, and Stevan Z. Knezevic. "Interspecific and intraspecific transference of metabolism-based mesotrione resistance in dioecious weedy *Amaranthus*." *The Plant Journal*, 96, no. 5 (2018): 1051-1063.
22. Margaret B. Fleming, **Eric L. Patterson**, Patrick A. Reeves, Christopher M. Richards, Todd A. Gaines, and Christina Walters. "Exploring the fate of mRNA in aging seeds: protection, destruction, or slow decay?." *Journal of experimental botany*, 69, no. 18 (2018): 4309-4321.
23. Karl Ravet, **Eric L. Patterson**, Hansjörg Krähmer, Kateřina Hamouzová, Longjiang Fan, Marie Jasieniuk, Amy Lawton-Rauh et al. "The power and potential of genomics in weed biology and management." *Pest management science*, 74, no. 10 (2018): 2216-2225.

24. Anita Küpper, Harish K. Manmathan, Darci Giacomini, **Eric L. Patterson**, William B. McCloskey, and Todd A. Gaines. "Population genetic structure in glyphosate-resistant and-susceptible Palmer amaranth (*Amaranthus palmeri*) populations using genotyping-by-sequencing (GBS)." *Frontiers in Plant Science*, 9 (2018): 29.
25. Dean J. Pettinga, Junjun Ou, **Eric L. Patterson**, Mithila Jugulam, Philip Westra, and Todd A. Gaines. "Increased chalcone synthase (CHS) expression is associated with dicamba resistance in *Kochia scoparia*." *Pest management science*, 74, no. 10 (2018): 2306-2315.
26. Maxwell C. Oliveira, Todd A. Gaines, Franck E. Dayan, **Eric L. Patterson**, Amit J. Jhala, and Stevan Z. Knezevic. "Reversing resistance to tembotrione in an *Amaranthus tuberculatus* (var. *rudis*) population from Nebraska, USA with cytochrome P450 inhibitors." *Pest management science*, 74, no. 10 (2018): 2296-2305.
27. **Eric L. Patterson**, Dean J. Pettinga, Karl Ravet, Paul Neve, and Todd A. Gaines. "Glyphosate resistance and EPSPS gene duplication: Convergent evolution in multiple plant species." *Journal of Heredity*, 1 (2017): 9.
28. Debalin Sarangi, Andrew J. Tyre, **Eric L. Patterson**, Todd A. Gaines, Suat Irmak, Stevan Z. Knezevic, John L. Lindquist, and Amit J. Jhala. "Pollen-mediated gene flow from glyphosate-resistant common waterhemp (*Amaranthus rudis* Sauer): consequences for the dispersal of resistance genes." *Scientific Reports*, 7 (2017): 44913.
29. **Eric L. Patterson**, Margaret B. Fleming, Kallie C. Kessler, Scott J. Nissen, and Todd A. Gaines. "A KASP Genotyping Method to Identify Northern Watermilfoil, Eurasian Watermilfoil, and Their Interspecific Hybrids." *Frontiers in plant science*, 8 (2017) 752.
30. Derek J. Sebastian, Margaret B. Fleming, **Eric L. Patterson**, James R. Sebastian, and Scott J. Nissen. "Indaziflam: A New Cellulose Biosynthesis Inhibiting Herbicide Provides Long-Term Control of Invasive Winter Annual Grasses." *Pest Management Science*, 73, no. 10 (2017): 2149-2162.
31. Anita Küpper, Ednaldo A. Borgato, **Eric L. Patterson**, Acácio Gonçalves Netto, Marcelo Nicolai, Saul JP de Carvalho, Scott J. Nissen, Todd A. Gaines, and Pedro J. Christoffoleti. "Multiple Resistance to Glyphosate and Acetolactate Synthase Inhibitors in Palmer Amaranth (*Amaranthus palmeri*) Identified in Brazil." *Weed Science*, 65, no. 3 (2017): 317-326.
32. Caio ACG Brunharo, **Eric L. Patterson**, Daniela R. Carrijo, Marcel SC de Melo, Marcelo Nicolai, Todd A. Gaines, Scott J. Nissen, and Pedro J. Christoffoleti. "Confirmation and mechanism of glyphosate resistance in tall windmill grass (*Chloris elata*) from Brazil." *Pest management science*, 72, no. 9 (2016): 1758-1764.
33. Todd A. Gaines, Abigail L. Barker, **Eric L. Patterson**, Philip Westra, Eric P. Westra, Robert G. Wilson, Prashant Jha, Vipin Kumar, and Andrew R. Kniss. "EPSPS Gene Copy Number and Whole-Plant Glyphosate Resistance Level in *Kochia scoparia*." *PloS one*, 11, no. 12 (2016): e0168295.

OTHER WRITINGS

1. Margaret Fleming, **Eric L. Patterson**, Anita Küpper, Karl Ravet, Todd Gaines, and Patrick Tranel. 2016. Application of Genomics in Weed Science. Book Chapter in *Biology, Physiology*

and Molecular Biology of Weeds. CRC Press and the Taylor and Francis Group. Accepted, in press.

2. Kallie C. Kessler, Margaret B. Fleming, **Eric L. Patterson**. 2017. High Throughput Method to Genotype Plants. Patent.
3. Quoted in and Edited WSSA Press Release on 11/3/2020. “WSSA Provides an Update on Weed Genomics & What Scientists Are Learning”

INVITED PRESENTATIONS

1. Plant and Environmental Sciences Department Seminar. Clemson University. “*Working with new herbicide modes of action: What we have learned from Indaziflam.*” 2/12/2021
2. International Weed Genomics Consortium Annual Meeting. Kansas City, Mo. “*Annotation of IWGC Genomes*” 9/23/2021
3. North Central Weed Science Society Annual - Meeting Industry Breakfast. “*The International Weed Genomics Consortium: A Public & Private Collaboration*”. **Eric L. Patterson**. 12/16/21
4. North Central Weed Science Society Annual Meeting - Climate Change Symposium. *The Effects of a Changing Climate on Weed Populations and Herbicide Resistance Evolution*. **Eric L. Patterson**. 12/15/21
5. Rueters Turfgrass Research Symposium. *Developing molecular tools for resistance trait discovery and diagnostics in turfgrass systems*. **Eric L. Patterson** 3/18/22
6. European Weed Research Society. Athens, Greece. The International Weed Genomics Consortium, The current status and applications of weed genomics. **Eric L. Patterson**, Todd Gaines, Dana MacGregor, Roland Beffa, and Mithila Jugulam. 6/23/22

CONFERENCE PRESENTATIONS (ORAL)

1. Comparative Analysis of Weedy and Grain Amaranthus Species Reveals Mobilome Contributing to Genome Diversity. Damilola A. Raiyemo*, Jacob S. Montgomery, Nathan D. Hall, **Eric L. Patterson**, Patrick Tranel. North Central Weed Science Society Annual Meeting. (2021)
2. Evaluating Potential Fitness Costs Associated with Clopyralid Resistance in Common Ragweed (*Ambrosia artemisiifolia*). Nash D. Hart*, **Eric L. Patterson**, Erin E. Burns. North Central Weed Science Society Annual Meeting. (2021)
3. Diagnostics for ALS and Glyphosate Resistance in Michigan Soybean. Juliano R M Sulzback*, Erin C. Hill, Jinyi Chen, **Eric L. Patterson**. North Central Weed Science Society Annual Meeting. (2021)
4. Understanding a New Mechanism of Dicamba resistance in *Bassia scoparia*. Jacob S. Montgomery*, Neeta Soni, Sarah Morran, **Eric L. Patterson**, Philip Westra, Franck E. Dayan, Todd A. Gaines. North Central Weed Science Society Annual Meeting. (2021)

5. Annotation of IWGC Genomes. **Eric L. Patterson***. International Weed Genomics Consortium Conference. (2021)
6. An IWGC Genome Success Story: Glyphosate, Genomic Structural Variation, and Resistance. **Eric L. Patterson**. Plant Biology Worldwide Summit (PB21). (2021)
7. The International Weed Genomics Consortium: A Resource for Weed Genomics. Sarah Morran, Paul Neve, **Eric L. Patterson**, Scott McElroy, Roland S. Beffa, Todd A. Gaines. Weed Science Society of America Annual Meeting. (2020)
8. Exploring the Dynamics of EPSPS and Abiotic Stress Genes in Kochia. Philip Westra, Andrew D. Effertz, Todd A. Gaines, Crystal D. Sparks, **Eric L. Patterson**. Weed Science Society of America Annual Meeting. (2020)
9. The Genome of Kochia scoparia: A Story of Evolution in Action. **Eric L. Patterson**, Todd A. Gaines, Christopher A. Saski, Philip Westra, Crystal D. Sparks. Weed Science Society of America Annual Meeting. (2020)
10. The Mechanism of Glyphosate Resistance via Transposon-Mediated EPSPS Tandem Gene Duplication in *K. scoparia*. **Eric L. Patterson**, Todd Gaines, Chris A. Saski, Daniel B. Sloan, Patrick J. Tranel, Philip Westra. North Central Weed Science Society Annual Meeting. (2019)
11. Trifluralin Resistance and a Helical Growth Phenotype in Annual Ryegrass. Jinyi Chen, Stephen Powles, Heping Han, Danica Goggin, Geoffrey Wasteneys, **Eric L. Patterson**, Qin Yu. North Central Weed Science Society Annual Meeting. (2019)
12. New insights into Target Site and Non-Target Site Resistance to Synthetic Auxin Herbicides. Todd A. Gaines, Marcelo Figueiredo, Olivia E. Todd, Neeta Soni, **Eric L. Patterson**, Anita Kuepper, Chris Preston, Cris Argueso1, Anireddy Reddy, Philip Westra, Franck Dayan. North Central Weed Science Society Annual Meeting. (2019)
13. Comparative Analysis of Glyphosate Resistant and Sensitive Genomes Indicates Genome Rearrangement as a Mechanism of Adaptation. **Eric L. Patterson***, William Molin, Daniel Peterson, Chris Saski. Weed Science Society of America Annual Meeting. (2019)
14. Comparison of *EPSPS* Tandem Duplication Sequence Across Glyphosate-Resistant *Kochia scoparia* Populations. Todd Gaines*, **Eric L Patterson**, Andrea Dixon, Crystal Sparks, Karl Ravet, Anita Kuepper, Philip Westra. Weed Science Society of America Annual Meeting. (2019)
15. The mechanism of dicamba resistance and its physiological consequences in *Kochia scoparia*. **Eric L. Patterson***, Dean Pettinga, Sherry LeClere, Junjun Ou, Mithila Jugulam, Doug Sammons, Phil Westra, Todd Gaines. Plant and Animal Genomes. (2018)
16. Genome sequencing and assembly for *Kochia scoparia*. **Eric L. Patterson***; Karl Ravet; Pat Tranel; Dan Sloan; Phil Westra; Chris Saski; Todd Gaines. Global Herbicide Resistance Challenge. (2017)
17. The draft genome of *Kochia scoparia*: A foundation for studying adaptive evolution and its impacts on genome architecture. **Eric L. Patterson***, Chris Saski, Karl Ravet, Dean J. Pettinga, Phil Westra, Dan Sloan, Pat Tranel, and Todd Gaines. Plant and Animal Genomes. (2017).

18. A draft genome of *Kochia scoparia*. **Eric L. Patterson***, Karl Ravet, Dean Pettinga, Phil Westra, Dan Sloan, Chris Saski, and Todd A. Gaines. North Central Society of Weed Science Annual Meeting. (2017)
19. Modelling pollen-mediated gene flow from herbicide-resistant weeds: Common Waterhemp as an example. Debalin Sarangi*, Andrew J. Tyre, **Eric L. Patterson**, Todd A. Gaines, Suat Irmak, Stevan Knezevic, John Lindquist, Amit J. Jhala. North Central Society of Weed Science Annual Meeting. (2016)
20. Applying new molecular techniques to address issues related to herbicide resistance, Invasive Species and the Genetics of Non-Model Organisms. **Eric L. Patterson***. North Central Society of Weed Science Annual Meeting. (2016)
21. Human selection on the genome of the invasive agronomic weed, *Kochia scoparia*. **Eric L. Patterson***, Karl Ravet, Chris Saski, Todd Gaines. Genomics of Adaptation to Human Context. (2016)
22. Using multiple sequencing platforms to assemble the genome of *Kochia Scoparia*. Karl Ravet*, **Eric L. Patterson**, Philip Westra, Patrick J. Tranel, Todd A. Gaines. International Weed Science Congress. (2016)
23. Population genomics of glyphosate-resistant palmer amaranth (*Amaranthus palmeri*) using genotyping-by-sequencing (GBS). Anita Küpper*, Harish K. Manmathan, William B. McCloskey, **Eric L. Patterson**, Scott J. Nissen, Scott D. Haley, Todd A. Gaines. International Weed Science Congress. (2016)
24. Weed genomes as potential sources of new, adaptive agronomic traits: a summary of *Kochia scoparia* research in North America. Phil Westra*, Andrew Wiersma, Dean Pettinga, **Eric Patterson**, Franck Dayan, Patrick J. Tranel, Karl Ravet, Daniel Sloan, Todd Gaines. International Weed Science Congress. (2016)
25. An in vitro system for predicting herbicide subcellular partitioning. **Eric L. Patterson***, Scott J. Nissen, Todd Gaines. Western Society of Weed Science Annual Meeting. (2016)
26. Using multiple sequencing platforms to assemble the *Kochia scoparia* genome. Todd A. Gaines*, **Eric L. Patterson**, Karl Ravet, Patrick Tranel, Philip Westra. Western Society of Weed Science Annual Meeting. (2016)
27. Population genomics of glyphosate-resistant palmer amaranth (*Amaranthus palmeri*) using genotyping-by-sequencing (GBS). Anita Küpper*, Harish Manmathan, William McCloskey, **Eric L. Patterson**, Scott J. Nissen, Scott Haley, Todd Gaines. Western Society of Weed Science Annual Meeting. (2016)
28. Genome assembly of *Kochia scoparia*. **Eric L. Patterson***, Karl Ravet, Phil Westra, and Todd Gaines. Bayer Crop Science Global Research Meeting. (2015)
29. Genomic variability in kochia and its potential impact on weediness. **Eric L. Patterson***, Phil Westra, Pat Tranel, Suzanne Royer, and Todd Gaines. Western Society of Weed Science Annual Meeting (2015)

30. Population genetics of glyphosate-resistant palmer amaranth. 2015. Anita Kuepper*, William McCloskey, **Eric L. Patterson**, Scott J. Nissen, Todd Gaines. Western Society of Weed Science Annual Meeting (2015)
31. EPSPS gene amplification in Kochia from Sugar Beet Fields. Todd A. Gaines*, Abigail Barker, **Eric L. Patterson**, Philip Westra, Scott J. Nissen, Robert G. Wilson, Andrew R. Kniss. Western Society of Weed Science Annual Meeting. (2015)
32. DNA lab demonstration for regional scientists with Bayer Crop Science. **Eric L. Patterson**, Dean Pettinga, and Todd Gaines. Colorado State University -- Bayer Tours (2015)

PRESENTATIONS (POSTER)

1. The Functional Annotation of Weedy Genomes for the International Weed Genomics Consortium. Nathan D. Hall*, **Eric L. Patterson**. North Central Weed Science Society Annual Meeting (2021)
2. The Genomic Response of Kochia scoparia to Sub-lethal Doses of Glyphosate. Carly A. Claucherty*, Nathan Hall, Todd Gaines, **Eric L. Patterson**. North Central Weed Science Society Annual Meeting (2021)
3. Role of Glyphosate Retention and Absorption on Tolerance of Two Horseweed Growth Types. Justine L. Fisher*, John A. Schramski, **Eric L. Patterson**, Christy Sprague. North Central Weed Science Society Annual Meeting (2021)
4. Investigating Clopyralid Resistance in Ambrosia artemisiifolia (Common Ragweed) Using RNA Sequence Transcriptome Analysis. Nash D. Hart*, Erin E. Burns, **Eric L. Patterson**. North Central Weed Science Society Annual Meeting (2021)
5. Phragmites australis In Colorado: Haplotype Distribution and Molecular Tools for Management Decisions. Neeta Soni, **Eric L. Patterson**, Luke Tembrock, Todd A. Gaines. Weed Science Society of America Annual Meeting (2020)
6. Tolerance of Two Horseweed Growth Types to Glyphosate. John A. Schramski, Christy Sprague, **Eric L. Patterson**. North Central Weed Science Society Annual Meeting (2019)
7. Determining Single or Multiple Origins of Glyphosate Resistant Kochia scoparia by Comparison of EPSPS Sequence Duplication Across Populations. Todd A. Gaines, **Eric L. Patterson**, Andrea Dixon, Crystal D. Sparks, Karl Ravet, Philip Westra, Joel Felix, Don W. Morishita, Prashant Jha, Andrew Kniss. North Central Weed Science Society Annual Meeting (2019)
8. Studying gene copy number variation and glyphosate resistance using genomics in the weedy species, *Kochia scoparia*. **Eric Patterson***, Chris Sasaki, Phil Westra, Karl Ravet, Dan Sloan, Todd Gaines. Graybill Conference on Statistical Genomics and Genetics (2017).
9. Decreased intercellular transport due to increased flavonoid biosynthesis: A candidate dicamba resistance mechanism. Dean J. Pettinga*, **Eric L. Patterson**, Phil Westra, Todd A. Gaines. Plant and Animal Genomes (2017)
10. Quick genotyping for an ACCase herbicide resistance gene in wheat using KASP Assay. Curtis M. Hildebrandt*, **Eric L. Patterson**, Todd A. Gaines. Plant and Animal Genomes (2017).

11. An in vitro system for predicting herbicide subcellular partitioning. **Eric L. Patterson***, Scott J. Nissan, Todd A. Gaines. International Weed Science Congress, (2016)
12. Confirmation and mechanism of glyphosate resistance in tall windmill grass (*Chloris elata*) from Brazil. Caio A. C. G. Brunharo*, **Eric L. Patterson**, Daniela Carrijo, Marcel S. C. Melo, Marcelo Nicolai, Todd A. Gaines, Scott J. Nissen, Pedro J. Christoffoleti. International Weed Science Congress (2016)
13. Using RNA-Seq to explore dicamba resistance mechanisms in *Kochia scoparia*. Dean Pettinga*, **Eric L. Patterson**, Phil Westra, and Todd Gaines. American Society of Plant Biologists - Western Meeting (2016)
14. Developing simple sequence repeat (SSR) markers for *Kochia scoparia*. Adrian Quicke*, Dean Pettinga, **Eric L. Patterson**, Karl Ravet, Philip Westra, Patrick Tranel, Todd A. Gaines. Western Society of Weed Science Annual Meeting (2016).
15. Mining a weedy genome for traits of agronomic importance. **Eric L. Patterson***, Karl Ravet, Phil Westra, and Todd Gaines. CSU Graduate Student Showcase. (2015).
16. The genome of *Kochia scoparia*. **Eric L. Patterson***, Phil Westra, Pat Tranel, and Todd Gaines. Center for the Ecology Evolution and Management of Pesticide Resistance (CEEMPR) organizational meeting (2015).

PROFESSIONAL MEETINGS ATTENDED

1. 19th European Weed Research Society. Athens, Greece. June 20-23, 2022.
2. North Central Weed Science Society. Grand Rapids, Michigan. December 13th-16th, 2021.
3. International Weed Genomics Consortium Conference. Kansas City, MO. September 22nd-24th 2021.
4. Plant Biology Worldwide Summit (PB21). Remote. July 19th-23rd, 2021.
5. Weed Science Society of America Annual Meeting. Remote. Feb 15th-19th, 2021.
6. North Central Weed Science Society. Remote. December 13th-16th, 2020.
7. Weed Science Society of America Annual Meeting. Maui, HI. March 2nd-3rd, 2020.
8. North Central Weed Science Society. Columbus, OH. December 10th-13th, 2019.
9. Kochia Work Group Summit. Denver, CO. October 16th-18th, 2019.
10. Weed Science Society of America. New Orleans, LA. February 11th -14th, 2019
11. Weed Science Society of America. Arlington, VA. January 29th - February 1st, 2018
12. Plant and Animal Genomes, San Diego, CA. Jan. 13th, 2018.
13. 14th Graybill Conference on Statistical Genomics and Genetics, Fort Collins CO. June 5-7, 2017.

14. Global Herbicide Resistance Challenge, Denver, CO. May 14-18, 2017.
15. Plant and Animal Genomes, San Diego, CA. Jan. 17th, 2017.
16. North Central Society of Weed Science Annual Meeting, Des Moines, IA. Dec. 12-15, 2016.
17. Genomics of Adaptation to Human Context, Fort Collins, CO. July 30th, 2016.
18. International Weed Science Congress, Prague, Czech Republic. June 19-25, 2016.
19. Western Society of Weed Science Annual Meeting, Albuquerque, NM. Mar. 7-10, 2016.
20. CSU Graduate Student Showcase, Fort Collins, CO. Nov. 11, 2015.
21. Western Society of Weed Science Annual Meeting, Portland, OR. Mar. 9-12, 2015
22. Center for the Ecology Evolution and Management of Pesticide Resistance (CEEMPR) organizational meeting, Lincoln, NE. Sep. 29 - Oct. 1, 2014.
23. Western Society of Weed Science Annual Meeting, Colorado Springs, CO. Mar. 10-13, 2014.

GRANT APPLICATIONS, FUNDING, SCHOLARSHIPS, AND AWARDS

Funding and Pending while appointed at Michigan State University. Submitted as PI

1. PI: Patterson, Co-PI: Hill. North Central Integrated Pest Management. **\$21,992**. *Developing Molecular Tools to Increase Throughput and Accuracy of Herbicide Resistance Weed Diagnostics* (2019-2020).
2. PI: Patterson. Bayer Crop Science. **\$30,000**. *Identification of a Non-target Site Resistance mechanisms to indaziflam in 2 populations of Poa annua*. (2020-2021).
3. PI: Patterson. Bayer Crop Science. **\$15,000**. *RNA-seq for identifying resistance mechanisms to indaziflam in 6 populations of Poa annua*. (2020-2021).
4. PI: Patterson. MTRAC AgBio Innovation Challenge. **\$7,500**. *Foliar applied RNA to break Herbicide Resistance* (2020)
5. PI: Patterson, Co-PI: Hill. Michigan Soybean Promotion Committee. **\$29,730**. *Expanding Molecular Herbicide Resistance Testing Capacity for Michigan Soybean Growers* (2021-2022)
6. PI: Patterson. International Weed Genomes Consortium (Industry partners: BASF, Bayer, Syngenta, Corteva CropLife International; Government agencies: Foundation for Food and Agriculture Research). Total: **\$2,940,000**, MSU Subaward: **\$688,352**. *Annotating weed genomes*. (2021-2024)
7. PI: Patterson, Co-PI: Lundquist. Project GREEN 2021. **\$39,000**. *Discovering the Site of Action of Indaziflam*. (2021-2022)
8. PI: Burns, Co-PI: Patterson. Project GREEN 2021. **\$79,258**. *Discovering the resistance mechanism to clopyralid in Ambrosia artemisiifolia*. (2021-2022)

9. PI: Burns, Co-PI: Patterson. Project GREEN 2021. **\$60,000**. Epidemiological Assessment of Herbicide Resistant Horseweed Populations in Michigan Field Crops. (2021-2022)
10. PI: Patterson. Bayer Crop Science. **\$46,000**. *Work on Indaziflam Site of action and Resistance*. (2021-2022).
11. PI: Patterson, Co-PI: Burns. Corn Marketing Program of Michigan. **\$10,290**. *Developing leaf disk assays for rapid herbicide resistance diagnostics*. (2022-2023)
12. PI: Patterson, Co-PI: Sprague. Soybean Promotion Committee. **\$26,168**. *Developing and improving new assays for rapid herbicide resistance diagnostics*. (2022-2023)

Other Funding while appointed at Michigan State University

1. PI: Gaines (CSU), Co-PI: Patterson (MSU), Tranel (UIUC), Jugulam (KSU). USDA-AFRI Foundation, Pests and Beneficial Species Panel. **\$24,769**. *International Weed Genomics Consortium (Conference Grant)*. (2020-2021)

Pending Funds

1. PI: Burns (MSU), Co-PI: Patterson (MSU). USDA-Crop Protection and Pest Management. **\$200,000**. *Epidemiological Assessment Of Critical Weed Populations For Proactive Sustainable Integrated Weed Management*. (2022-2025)
2. PI: Patterson (MSU), Co-PI: Nikolai (MSU). MTRAC-Starter Grant Program. **\$40,000**. *The Discovery of Natural Herbicides from Maple-Leaf Extracts*. (2022)
3. PI: Patterson (MSU). Project GREEN. **\$79,392.95** *Developing new assays for rapid herbicide resistance diagnostics*. (2022-2024)

Funding Prior to Michigan State University

1. Clemson Post Doctoral Research Fellowship. **\$137,500** for salary during my two years as post-doctoral candidate at Clemson University. (2018).
2. Rothemsted Research and Bayer Blackgrass Genome Project. **\$250,000** for research during my two years as post-doctoral candidate at Clemson University. (2018).
3. Minnesota Invasive Terrestrial Plants and Pests Center. **\$200,000** grant to develop markers to the identification of palmer amaranth in mixed amaranth seed collections. (2018).
4. Dow AgroScience. **\$60,000** in funding to improve the kochia genome assembly and annotate Auxin responsive genes. (2017/2018).
5. Colorado Department of Agriculture. **\$9,000** grant to develop molecular markers for tracking the spread of invasive biotypes of Phramites in the riparian areas of Colorado. (2017).
6. UPI corporate. **\$40,000** in funding to develop molecular markers for the identification of Eurasian, northern, and hybrid milfoil. (2016).

TEACHING

Michigan State University:

Fall 2019-21: CSS 326 (2 Credits) – Weed Science

Spring 2020/2022: CSS 893 (2 Credits) – Molecular Resistance Evolution
Spring 2021: CSS 805 (2 Credits) – Herbicide Action and Metabolism
Spring 2022: HRT 892 (1 Credit) – Plant Breeding and Genetics Seminar

Aims Community College:

Fall 2014-15: BIO 112 (5 Credits) - General College Biology II
Fall 2014-15: BIO 105 (4 Credits) - Science of Biology
Spring 2015: BIO 212 (Course Design) - Botany^[L]_[SEP]

Colorado State University:

Fall 2009-13: Eight semesters of graduate student teaching in Cell Biology, Plant Identification, and Introductory Biology.

Johns Hopkins University:

Summer 2009: Zoology instructor for the Center for Talented Youth summer program.

MENTORSHIP AND TRAINING

Undergraduate Mentorship

Brianna Wiemer, MSU. 2019-2020
Rachel Hadvina, MSU. 2019-2021
Carly Clarity, MSU. 2020
Hannah Daguinsin, Xavier University. Summer REU 2021
Matt Harper, MSU. 2020-2022
Michael Ozolins. 2022
Rachel Hall. 2022
Sarah Holmes, Truman College. Summer REU 2022
Kira Falash, Montana State University. Summer REU 2022

Graduate Student Mentorship

As Primary Advisor:

Carly Claucherty, Department of Plant, Soil, and Microbial Sciences, 2020
Mohit Mahey, Department of Plant, Soil, and Microbial Sciences, 2021
Juliano Sulzback, Department of Plant, Soil, and Microbial Sciences, 2021
Nick Johnson, Genetics & Genome Sciences Program, 2021

As committee member:

Omar Posos-Parra, Department of Entomology, 2019
Justine Fisher, Department of Plant, Soil, and Microbial Sciences, 2020
Manjot Sidhu, Department of Horticulture, 2020
Benjamin Pritchard, University of Tennessee, Plant Sciences Department, 2020
Nash Hart, Department of Plant, Soil, and Microbial Sciences, 2021
Greta Gallina, Horticulture Department, 2021
Mitchell Grinshpun, Microbiology and Molecular Genetics, 2021
Katherine Diehl, Rutgers University, Department of Plant Biology and Pathology 2021

Professionals

Jinyi Chen, Post Doctorial Researcher, MSU 2019-2021.
Nathan Hall, Post Doctorial Researcher, MSU 2020-2023

PROFESSIONAL SERVICE

1. North Central Weed Science Society. Herbicide Physiology. Section Chair. 2021
2. North Central Weed Science Society. Local Arrangements Committee. 2021
3. International Weed Genomics Consortium (IWGC) Conference. Training Organizer. 2021
4. International Weed Genomics Consortium. Executive Committee Member. 2020
5. North Central Weed Science Society. Session Chair for Herbicide Physiology & Molecular Biology. 2020
6. Bioagricultural Science and Pest Management graduate student mentor. 2018 Colorado State University, CO.
7. Member of the student judging committee. Western Society of Weed Science Annual Meeting, Mar. 12-15, 2018. Anaheim, CA.
8. Global Herbicide Resistance Challenge, Abstract editing committee member. May 14-18, 2017. Denver, CO.
9. Member of the student judging committee. Western Society of Weed Science Annual Meeting, Mar. 13-16, 2017. Coeur d'Alene, ID.
10. Session chair and discussion moderator of basic biology. Western Society of Weed Science Annual Meeting, Mar. 9-12, 2015. Portland, OR.

PROFESSIONAL AFFILIATIONS

American Society of Plant Biologists
 North Central Society of Weed Science
 Weed Science Society of America
 International Weed Science Society
 International Weed Genomes Consortium – Executive Committee Member

REVIEWER

Agronomy: ISSN 2073-4395
 Plants: ISSN 2223-7747
 International Journal of Molecular Sciences: ISSN 1422-0067
 Pest Management Science: ISSN 1526-4998
 Weed Science: ISSN 0043-1745
 Weed Research: ISSN 1365-3180
 PLOS-ONE: eISSN 1932-6203
 Plant Physiology: ISSN 1532-2548
 Nature Communications: ISSN 2041-1723

RESEARCHER PROFILE

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 ResearchGate: https://www.researchgate.net/profile/Eric_Patterson8
 Michigan State University: <https://www.canr.msu.edu/people/eric-patterson>
 Lab Website: <https://www.thepattersonplantlab.com/>