

Katherine J. Hayden, Ph.D.

AgreenSkills Postdoctoral Fellow
INRA Centre de Nancy / Université de Lorraine
UMR1136 Tree-Microbe Interactions
FR-54280 Champenoux
katherine.hayden@nancy.inra.fr

EDUCATION

University of California, Berkeley
Ph.D. in Environmental Science, Policy, and Management 2010
Dissertation: Variation and heritability of host susceptibility to the introduced pathogen *Phytophthora ramorum* in tanoak (*Lithocarpus densiflorus*, proposed name *Notholithocarpus densiflorus*) populations.
Adviser: Matteo Garbelotto, Ph.D.

University of California, Santa Cruz
B.A. with highest honors in Molecular, Cellular, and Developmental Biology 2002
Thesis: Plasticity in cyanogenesis of *Trifolium repens* L: Inducibility, fitness costs, and variable expression.
Adviser: Ingrid M. Parker, Ph.D.

RESEARCH INTERESTS

The intersection of evolutionary theory and the management of natural systems, focusing on host-pathogen interactions, invasion biology, and emergent diseases, and using methods that range from classical quantitative genetics to genomics.

RESEARCH EXPERIENCE

Institut National de la Recherche Agronomique
AgreenSkills Postdoctoral Fellow 2013-2015

University of California, Berkeley
Postdoctoral Researcher 2010-2013
Graduate Student Researcher 2002-2010
Staff Research Associate 2000-2002

University of California, Santa Cruz
Research Experience for Undergraduates (National Science Foundation) 2001
Laboratory Assistant 1998-2001

GRANT FUNDING

University of California policies preclude Postdoctoral Researchers from serving as Principal Investigator; Dr. Hayden was a primary author of each grant listed.

Title	P.I.	Awarding Agency	Amount	Dates
Reducing Spread of Sudden Oak Death: Phosphonate Mode of Action	Matteo Garbelotto, Jessica Wright	The Gordon and Betty Moore Foundation	\$474,836	2010-2014
Variation in <i>Lithocarpus densiflorus</i> (Tanoak) Resistance to <i>Phytophthora ramorum</i>	Matteo Garbelotto, Jessica Wright, Richard Dodd	USDA-Forest Service, Pacific Southwest Research Station	\$309,255	2006-2012

Title	P.I.	Awarding Agency	Amount	Dates
Variation in <i>Lithocarpus densiflorus</i> (Tanoak) Resistance to <i>Phytophthora ramorum</i>	Matteo Garbelotto	National Park Service, Pacific Coast Science and Learning Center	\$2,500	2008-2009
Biology, Epidemiology and Behavior of <i>Phytophthora ramorum</i>	Matteo Garbelotto, Richard Dodd	USDA-Forest Service, Pacific Southwest Research Station	\$224,169	2004-2006

REFEREED PUBLICATIONS

Eyre, C.A., Hayden, K.J., Kozanitas, M., Grünwald, N.J., Garbelotto, M. In press. Evolutionary lineage interacts with temperature and host to influence *Phytophthora ramorum* virulence. *Plant Disease*.

Hayden, K.J., Garbelotto, M., Cronn, R., Knaus, B., Rai, H., Wright, J.W. 2014. Dual RNA-seq of the plant pathogen *Phytophthora ramorum* and its tanoak host. *Tree Genetics and Genomes*. doi: 10.1007/s11295-014-0698-0

Hayden, K.J., Garbelotto, M., Dodd, D., Wright, J.W. 2013. Scaling up from greenhouse to field resistance to an introduced forest disease reveals the potential for evolution and management. *Evolutionary Applications*. doi:10.1111/eva.12080.

Rai, H., Mock, K., Richardson, B., Cronn, R., Hayden, K., Wright, J., Knaus, B., Wolf, P. 2013 Transcriptome characterization and detection of gene expression differences in aspen (*Populus tremuloides*). *Tree Genetics and Genomes*. doi: 10.1007/s11295-013-0615-y.

Cobb, R., Metz, M., Frangioso, K., Garbelotto, M., Hayden, K.J., Rizzo, M. 2013. Biodiversity conservation in the face of dramatic forest disease: an integrated conservation strategy for tanoak (*Notholithocarpus densiflorus*) threatened by sudden oak death. *Madroño* 60: 151-164.

Osmundson, T., Eyre, C., Hayden, K., Dhillon, J., Garbelotto, M. 2013 Back to basics: An evaluation of NaOH and alternative rapid DNA extraction protocols for DNA barcoding, genotyping, and disease diagnostics from fungal and oomycete samples. *Molecular Ecology Resources*.

Garbelotto, M. and Hayden, K.J. 2012. Sudden Oak Death: interactions of the exotic oomycete *Phytophthora ramorum* with naïve North American hosts. *Eukaryotic Cell* doi: 10.1128/EC.00195-12.

Hayden, K.J., Nettel, A., Dodd, R., Garbelotto, M. 2011. Will all the trees fall? Variable resistance to an introduced forest disease in a highly susceptible host. *Forest Ecology and Management* 261: 1781-1791.

Hüberli, D., Hayden, K.J., Calver, M., Garbelotto, M. 2011. Intraspecific variation in host susceptibility and climatic factors mediate the progression of sudden oak death in US woodlands. *Plant Pathology* doi: 10.1111/j.1365-3059.2011.02535.x.

Hayden, K.J., Ivors, K., Wilkinson, C., Garbelotto, M. 2006. TaqMan chemistry for *Phytophthora ramorum* detection and quantification, with a comparison of diagnostic methods. *Phytopathology* 96: 846-854.

Swain, S., Harnik, T., Mejia-Chang, M., Hayden, K., Bakx, W., Creque, J., Garbelotto, M. 2006. Composting is an effective treatment option for sanitization of *Phytophthora ramorum*-infected plant material. *Journal of Applied Microbiology* 101: 815-827.

Hayden, K.J., Rizzo, D., Tse, J., Garbelotto, M. 2004. Detection and quantification of *Phytophthora ramorum* from California forests using a real-time polymerase chain reaction assay. *Phytopathology* 94: 1075-1083.

Ivors, K.L., Hayden, K.J., Bonants, P.J.M., Rizzo, D.M., Garbelotto, M. 2004. AFLP and phylogenetic analyses of North America and European populations of *Phytophthora ramorum*. *Plant Disease* 89: 204.

Hayden, K.J., Parker, I.M. 2002. Plasticity in cyanogenesis of *Trifolium repens* L: Inducibility, fitness costs, and variable expression. *Evolutionary Ecological Research* 4: 155-168.

BOOK CHAPTERS

Hayden, K.J., Hardy, G.E.St.J., Garbelotto, M. Oomycete Diseases. 2013. In: Gonthier, P., Nicoletti, G. (Eds.), *Infectious Forest Diseases*, CABI, Oxfordshire, UK.

EXTENDED ABSTRACTS, TECHNICAL REPORTS, AND OTHER PAPERS

Hayden, K.J., Wright, J.W., Dodd, R., Garbelotto, M. Developing a disease resistance research program for tanoaks. In: Sniezko, R.A.; Yanchuk, A.D.; Kliejunas, J.T.; Palmieri, K.M.; Alexander, J. M. and Frankel, S.J. tech. coords. 2013. *Disease and Insect Resistance in Forest Trees: Proceedings of the 4th International Workshop on the Genetics of Host-Parasite Interactions in Forestry*. Gen. Tech. Rep. PSW-GTR-240. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA.

Hayden, K.J., Lundquist, A., Schmidt, D.J., Sniezko, R.A., Frankel, S.J., Garbelotto, M. 2010. Tanoak resistance: Can it be used to sustain populations? In: Frankel, S.J., Kliejunas, J.T., Palmieri, K.M. (Eds.), *Proceedings of the Sudden Oak Death Fourth Science Symposium*. Gen. Tech. Rep. PSW-GTR-229. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, CA, pp. 183-188.

Dodd, R., Frankel, S., Grünwald, N., Hansen, E., Hayden, K., Kubisiak, T., and Sniezko, R. 2005. Utilizing genetic information to address *Phytophthora ramorum*/Sudden Oak Death. A whitepaper of the USDA Forest Service, Pacific Southwest Research Station.

Garbelotto, M., Rizzo, D.M., Hayden, K., Meija-Chang, M., Davidson, J.M., Tjosvold, S. 2002. *Phytophthora ramorum* and sudden oak death in California: III. Preliminary studies in pathogen genetics. USDA Forest Service General Technical Report No. PSW-GTR-184: 765-774.

INVITED PRESENTATIONS

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| Developing a sudden oak death resistance research program for tanoaks, from acorns to RNA-seq. Seminar, Department of Biology, Sonoma State University | 2012 |
| Emergent diseases in plant communities. Guest lecture, Microbial Ecology, University of California, Berkeley | 2012 |
| Sudden oak death assays. Presentation at Forest Health Initiative Workshop on Early Screening Resistance Assays, Asheville, NC | 2010 |
| Tanoak resistance: Can it be used to sustain populations? Presentation at California Oak Mortality Task Force Annual Meeting, San Rafael, CA | 2008 |
| Is resistance futile? Tanoak and an invasive forest pest. Poster at Graduate Research Symposium for the Environmental Science, Policy and Management, Berkeley, CA | 2007 |

PCR-Based detection of *Phytophthora ramorum*. Special session for regulators, 2004
The Sudden Oak Death 2nd Science Symposium: The State of our Knowledge
Monterey, CA

ORAL [O] AND POSTER [P] PRESENTATIONS

Hayden K. J., Xhaard C., Fabre B., Halkett F., **Frey P.** Adaptation of poplar rust to the poplar varietal landscape. IUFRO Joint Meeting on Genetics of Five-Needle Pines and Rusts in Mountain Landscapes, Fort Collins, Colorado, U.S.A., June 15-20, 2014 [O]

Frey P., Hayden K. J., Xhaard C., Halkett F. Adaptation des champignons phytopathogènes aux pressions anthropiques en lien avec l'émergence de maladies des plantes. Symposium ADEFACE (Adaptation des eucaryotes face aux changements environnementaux), Gif-sur-Yvette, April 3, 2014 [O]

Hayden, K.J., Halkett, F., Fabre, B., Frey, P. Adaptation of poplar rust to the poplar varietal landscape. 10e Journées Jean Chevaugéon, Centre Paul Langevin, Aussois, France, January 27–31, 2014

[O, P]

Hayden, K.J., Wright, J., Eyre, C., Garbelotto, M. Nursery, field, and high-throughput sequencing studies of partial host resistance to an introduced forest disease. North American Congress for Conservation Biology. July 15-18, 2012, Oakland CA. [O]

Hayden, K.J., Garbelotto, M., Cronn, R., Knaus, B., Rai, H., Wright, J.W. Using genomics to study tanoak's past, present, and future. 5th Sudden Oak Death Science Symposium, June 19-22, 2012, Petaluma, CA [O]

Hayden, K.J., Wright, J.W., Dodd, R., Eyre, C., Garbelotto, M. Scaling up from greenhouse to field resistance in tanoaks. 5th Sudden Oak Death Science Symposium, June 19-22, 2012, Petaluma, CA [P]

Cronn, R., Hayden, K., Klopfenstein, N., Knaus, B., Mock, K., Rai, H., Richardson, B., Ross-Davis, A., Wright, J., Udall, J. Western Forest Transcriptome Survey: Applying genomic discoveries towards understanding genome responses to climate change. Plant and Animal Genomes conference, San Diego, CA, 2012 [P]

Hayden, K.J., Garbelotto, M., Rai, H., Knaus, B., Cronn, R., Wright, J.W.W. Gene expression in the tanoak – *Phytophthora ramorum* interaction. Plant and Animal Genomes conference, San Diego, CA, 2012 [P]

Hayden, K.J., Garbelotto, M., Rai, H., Knaus, B., Cronn, R., Wright, J.W.W. Gene expression in the tanoak – *Phytophthora ramorum* interaction. Fourth International Workshop on the Genetics of Host-Parasite Interactions in Forestry, Eugene, OR, 2011 [P]

Hayden, K.J., Wright, J.W., Dodd, R., Garbelotto, M. Looking for resistance to an introduced pathogen in a highly susceptible host: I. Quantitative studies of the tanoak-*Phytophthora ramorum* interaction. Evolution, Portland, OR, 2010 [O]

Wright, J.W., Hayden, K.J., Garbelotto, M., Knaus, B. J., Cronn, R. Looking for resistance to an introduced pathogen in a highly susceptible host: II. Transcriptomic studies of the tanoak-*Phytophthora ramorum* interaction. Evolution, Portland, OR, 2010 [P]

Hayden, K., Rickard, H., Garbelotto, M. Correlating *Phytophthora ramorum* infection rate and

lesion expansion in tanoak. Sudden Oak Death Science Symposium III, Santa Rosa, CA, 2007 [P]

Hayden, K., Garbelotto, M. Variation in susceptibility of tanoak to *Phytophthora ramorum* at the population and species level. American Phytopathological Society Annual Meeting, Austin, TX, 2005 [P]

Hayden, K., Garbelotto, M. Quantitative resistance to *Phytophthora ramorum* in tanoak. The Sudden Oak Death 2nd Science Symposium: The State of our Knowledge. Monterey, CA, 2004 [P]

Schinsing, L., Hayden, K. Garbelotto, M. Environmental limits to infection by *Phytophthora ramorum* in tanoak and California bay laurel. The Sudden Oak Death 2nd Science Symposium: The State of our Knowledge. Monterey, CA, 2004 [P]

Hayden, K., Garbelotto, M. Quantification of *Phytophthora ramorum in planta* using real-time PCR. American Phytopathological Society Annual Meeting, July31-August 4, 2004, Anaheim, CA [O]

Hayden, K., Garbelotto, M. PCR-Based detection of *Phytophthora ramorum* in plant tissue. The Sudden Oak Death Science Symposium: The State of our Knowledge. December 15-18, 2002, Monterey, CA [O]

STUDENTS

Environmental Science Thesis Advisees

Marissa Montjoy	2011-2012
Heather Rickard	2006-2007
Lily Schinsing	2003-2004

Internship and Research Assistanceship Supervisees

Wesley Clark, Internship	2011
Jaskirn Dhillon, Environmental Leadership Pathway Project	2010
Kenan Celtik, Research Assistanceship	2009-2010

TEACHING

Graduate Student Instructor, Quantitative Genetics	2005
Graduate/Undergraduate, University of California, Berkeley	
Student Teacher, Environmental Science/Urban Environmental Education Practicum	2004
High School, University of California, Berkeley	
Scientific Writing Tutor, Plant Ecology	2000
Undergraduate, University of California, Santa Cruz	

AWARDS AND HONORS

AgreenSkills Fellow, Agreenium / INRA	2013-2015
William Carroll Smith Fellowship, University of California, Berkeley	2008
Chancellor's Award for Undergraduate Research, Dean's Award for Undergraduate Research, University of California, Santa Cruz	2002