USDA Forest Service, Pacific Southwest Research Station,
Sudden Oak Death/Phytophthora ramorum Research
2002 to 2010

Episodic abiotic stress and ramorum blight in nursery ornamentals: impacts on symptom expression and chemical management of *Phytophthora ramorum* in Rhododendron- Richard Bostock, UC Davis- $67,245 (To be conducted at the National Ornamentals Research Site at Dominican University of California) (2010)


Research in support of sudden oak death containment and management in Western tanoak forests. Everett Hansen, Oregon State University; Alan Kanskie, Oregon Department of Forestry and Ellen Michaels Goheen, USDA Forest Service, Forest Health Protection, Central Point, OR- $73,880 (2010)

Forest Health Research, Education and Outreach. David Lewis and Janice Alexander, University of California Cooperative Extension, Marin County- $69,042 (2010)


Re-measurement and analysis of long-term impacts of *Phytophthora ramorum* in mixed oak woodlands. R.K. Meentemeyer, University of North Carolina, Charlotte; N.E. Rank and J. Hall Cushman, Sonoma State University; David Rizzo, UC Davis- $76,540 (2010, for two years).

Efficacy of Sudden Oak Death adaptive management in Humboldt County. David Rizzo, UC Davis and Yana Valachovic, UC Cooperative Extension Humboldt and Del Norte Counties- $37,800 (2010)

Identifying insect pollenators to tanoak flowers in forests impacted by *Phytophthora ramorum*. Jessica Wright, USDA Forest Service, PSW Research- $2,920 (2010)
Comparative sporulation of *Phytophthora ramorum* on larch (*Larix*) and other key sporulating hosts, and the impact on Douglas-fir and Port Orford Cedar in the field. Joan Webber, UK Forest Research - $55,424 (2010)

Accelerated breakdown of leaf litter naturally infected by *Phytophthora ramorum* and *P. kernoviae* as a method of disease management. Joan Webber and Sandra Denman, UK Forest Research - $19,000; and Anna Maria Vettraino, University of Tuscia - $21,000 (2010)


Epidemiology of *Phytophthora ramorum* and *Phytophthora kernoviae* in the UK. Elizabeth Fichtner and David Rizzo, University of California Davis; Joan Webber, UK Forestry Research - $29,689 (2008, 2009)

Studying the epidemiology of *Phytophthora ramorum* in the air, soil and water, using a combination of intensive surveys and population genetic analyses. Matteo Garbelotto, University of California Berkeley - $162,800 (2008 –2009)


Studies on the latency period of *Phytophthora ramorum*. Marko Riedel, Stefan Wagner and Sabine Werres, Julius Kuehn Institute, Federal Centre for Cultivated Plants, Germany - $82,160 (2008, 2009, 2010)


Variation in Tanoak's Resistance to *Phytophthora ramorum*. Matteo Garbelotto and Katy Hayden, University of California Berkeley; Jessica Wright, USDA Forest Service, Pacific Southwest Research Station; Richard Dodd, University of California Berkeley; Richard Sniezko,


Epidemiology of *Phytophthora ramorum* in tanoak forests. Everett Hansen, Oregon State University - $757,880 (2004 - 2010)


Non-market economic impacts of Sudden Oak Death/*Phytophthora ramorum*, Jeffrey Englin, University of Nevada-Reno - $68,000 (2007, 2009)


Development of a risk model for Sudden Oak Death in Oregon. Alan Kanaskie, Oregon Department of Forestry; Ross Meentemeyer, University of North Carolina – Charlotte - $30,000 (2008)

Landscape-scale management of *P. ramorum*: linkages to conservation goals for the Garcia River Forest. David Rizzo, University of California Davis; Ross Meentemeyer, University of North Carolina – Charlotte - $142,390 (2008)
Effect of environmental conditions on sporulation of *P. ramorum*. Steve Tjosvold, UC Cooperative Extension, Santa Cruz and Monterey Counties - $40,000 (2008)


Systemic spread, asymptomatic infection, and infection potential of soilborne propagules in the disease cycle of *Phytophthora ramorum*. Jennifer Parke, Everett Hansen, and Barbara Lachenbruch, Oregon State University – $89,880 (2007, 2008)


Economic Impact Assessment for Sudden Oak Death/*Phytophthora ramorum* Tom Holmes, USDA Forest Service, Southern Research Station - $100,000 (2007, 2008)

Protecting true oak habitats from *Phytophthora ramorum* at the Garcia River Forest, Mendocino County, Jeanette Howard, The Nature Conservancy, San Francisco - $52,000 (2007)


Importance of Water-Runoff in Spreading Inoculum and Supporting New Infections of *Phytophthora ramorum* in Nursery and Landscape Conditions - Steve Tjosvold, UC Cooperative Extension - $114,144 (2007, 2008)

Eradication of *Phytophthora ramorum* from contaminated sites - J. D. MacDonald, UC-Davis - $20,905 (2005, 2006) Jointly funded with USDA-Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine


Evaluating the sporicidal efficacy of yellow-cedar heartwood toward *Phytophthora ramorum* spores in the litter and soil; Rick G. Kelsey. USDA Forest Service, Pacific Northwest Research Station - $17,600 (2004)

Systemic spread, asymptomatic infection, and infection potential of soilborne propagules in the disease cycle of *Phytophthora ramorum*; Jennifer Parke, Jeff Stone and Everett Hansen. Oregon State University - $433,951 (2005, 2006, 2007)

Determining the efficacy of a systems approach for producing nursery stock free of plant pathogenic *Phytophthora* species; Jennifer Parke, Oregon State University, and Niklaus J. Grunwald, USDA Agricultural Research Service, Corvallis - $150,000 (2005)


Biological and ecophysiological factors mitigating in planta survival of *Phytophthora ramorum* in California bay laurel. David Rizzo and Elizabeth Fichtner, UC Davis and Daniel Huberli, UC Berkeley - $140,000 (2005, 2006)

Seasonal symptom expression, detection, and potential for infectivity of *Phytophthora ramorum* on rhododendron and camellia; Steve Tjosvold. University of California Cooperative Extension. Santa Cruz Co. and Cheryl Blomquist, California Department of Food and Agriculture - $98,669 (2005, 2006)

Dissecting the population genetics of *Phytophthora ramorum* using a high density SNP Chip; Brett Tyler and others. Virginia Polytechnic Institute and State University - $100,631 (2005)

In vivo study of host-Phytophthora ramorum-interaction, using green fluorescent protein (GFP); Sabine Werres et al. Federal Biological Research Centre for Agriculture and Forestry (BBA), Germany - $66,560 (2005, 2006)

Screening northern red oak (*Quercus rubra* L.) for geographic as well as individual tree variation for resistant to the Sudden Oak Death pathogen *Phytophthora ramorum*. Thomas L. Kubisiak and Dana C. Nelson. USDA Forest Service, Southern Research Station - $46,512 (2004)

Predicting the effects of Sudden Oak Death on small vertebrates in high risk oak woodlands in San Luis Obispo County. William Tietje. Cooperative Extension, University of California Berkeley - $17,876 (2004)

Vertebrates as dispersal agents of *Phytophthora ramorum*, the pathogen that causes Sudden Oak Death. J. Hall Cushman & Ross K. Meentemeyer. Sonoma State University - $78,577 (2004)


*Phytophthora* species associated with potential *Phytophthora ramorum* sites in the central and eastern United States; Yilmaz Balci, West Virginia University - $50,000 (2004)


Movement of *Phytophthora ramorum* among Camellia spp in a nursery setting; Sibdas Ghosh. Dominican University of California - $54,523 (2004)

Sporulation, survival, distribution, and detection of soilborne inoculum of *Phytophthora ramorum* in forest ecosystems. David Rizzo and Elizabeth Fichtner. University of California Davis. - $118,000 (2005, 2006)


Biology, Epidemiology, and Behavior of *P. ramorum*; Matteo Garbelotto, University of California Berkeley - $145,000 (2004)


Influence of land-use history and vertebrates on the occurrence and spread of *Phytophthora ramorum*. J. Hall Cushman, and R. Meentemeyer, California State University, Sonoma, CA - $156,448 (2003-2004)

Development of DNA aptamers for field detection of *Phytophthora ramorum*. S. Doyle, Joint Genome Institute, Department of Energy/University of California, Berkeley -$205,458 (2003, 2004)


Modeling potential spread of *P. ramorum* in the conterminous United States: effects of different models on modeled risk. Maggi Kelly, University of California, Berkeley - $29,786 (2004)

Evaluating the role of host and non-host defensive chemicals on the pathogenicity and spore viability of *Phytophthora ramorum*. Rick Kelsey and Daniel Manter, USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR - $125,000 (2004, 2005)


The ecology and control of *Phytophthora ramorum* in nurseries. Jim MacDonald and R. Bostock, University of California, Davis, CA - $50,000 (2003)


Studies on treatment for prevention, management, and sanitation of Sudden Oak Death disease, with a particular emphasis on chemical treatments and composting Matteo Garbelotto, UC Berkeley - $152,000 (2002, 2003)


Disease progression and sporulation potential of *Phytophthora ramorum* on non-oak hosts, David Rizzo, UC-Davis - $210,000 (2002, 2003, 2004)

Utilization and disposal of *Phytophthora ramorum* infected oak and coordination of the PSW Sudden Oak Death research program: An effort to retard the spread of Sudden Oak Death Syndrome in the coastal habitat of California, Frank Beall and John Shelly, University of California, Forest Products Laboratory - $216,000 (2002, 2003, 2004)


A cytological and histological study of *Lithocarpus* and *Quercus* spp. infected with *Phytophthora ramorum*, Edwin R. Florance, Lewis and Clark College, Portland, OR - $20,000 (2002)

*Phytophthora ramorum* (Sudden Oak Death) in coast live oak and tanoak: Factors affecting disease risk, disease progression, and failure potential - Tedmud J. Swiecki - $308,401 (2002 to 2009)

Relationship between tree failure potential and *Phytophthora ramorum* canker (Sudden Oak Death), Tedmud J. Swiecki - $50,000 (2002)

Field evaluation to study a method of potential transmission of Sudden Oak Death (*Phytophthora ramorum*) by birds, C. J. Ralph, Pacific Southwest Research Station, Erick S. Jules, Humboldt State University, Arcata, CA - $74,000 (2002, 2003)

USDA-FS, Post doc. position. Develop the necessary protocols for testing laboratory susceptibility and field infection rates of SOD on various species of oaks, both those native to California and those found elsewhere in the United States. Stationed with David Rizzo, University of California, Davis - $70,000 (2002)

A study to determine the role of vertebrate vectors (birds and small mammals) in spreading *Phytophthora ramorum*, Keyt Fischer, Steve Zack, Wildlife Conservation Society, Cheryl Blomqust, California Department of Food and Agriculture - $45,000 (2002)


**Incoming funds.** The Midpeninsula Regional Open Space District is providing $60,000 over 3 years in research funds for Variation in Tanoak's Resistance to *Phytophthora ramorum*, Cindy Roessler (2007, 2008, 2009)

**Incoming funds.** The San Francisco Public Utilities Commission (SFPUC). An experimental management project to protect against the sudden oak death pathogen on the SFPUC Peninsula Watershed” - $192,000 (2008, 2009)