

USDA Forest Service, Pacific Southwest Research Station Sudden Oak Death Research Program: 2001-2005¹

Patrick J. Shea²

Key words: sudden oak death, USDA Forest Service, request for proposals, *Phytophthora ramorum*

The Pacific Southwest Research Station (PSW), U.S. Department of Agriculture (USDA) Forest Service initiated the Sudden Oak Death Research (SOD) Program in late 2000. The program was prompted by late fiscal year funding dedicated directly to begin research on this newly discovered disease. The history of discovery of *Phytophthora ramorum*, the causative agent of SOD, is now well known and will not be repeated here. During the initial start-up of the SOD Research Program, funding came from a variety of sources. Over the course of fiscal years (FY) 2001 and 2002, research funding was received from the USDA Commodity Credit Corporation, USDA Forest Service Research and Development and through a supplemental appropriation from the United States Congress. Starting in FY 2003 the SOD Research Program was funded through the regular appropriation process and was included in the PSW budget. In addition, during FY's 2002 and 2003 the California Department of Forestry and Fire Protection provided funds to be used for funding certain research projects administered by the SOD Research Program.

At the onset of the PSW SOD Research Program research on this disease and the causative agent was already in progress at several university laboratories, such as David Rizzo's laboratory at University of California, Davis, and Matteo Garbelotto's laboratory at the University of California, Berkeley. In addition, several plant pathologists associated with the University of California Cooperative Extension program were actively pursuing research on SOD in various locations in California. It is because of this ongoing non-USDA Forest Service research and the fact that PSW was not engaged in an active forest pathology research program that the SOD Research Program was, and continues to be, a largely extramural research program.

The PSW SOD Research Program functions much like any competitive grant program: (1) research needs are identified; (2) a Request for Proposals (RFP) is issued; (3) research proposals are evaluated for relevance to program needs and sent out for peer review; and (4) a selection committee makes the final decisions on which proposal are funded. During each funding year,

¹ A version of this paper was presented at the Sudden Oak Death Second Science Symposium: The State of Our Knowledge, January 18-21, 2005, Monterey, California.

² University of California, Berkeley, and USDA Forest Service, Pacific Southwest Research Station, Davis, California. pjshea@davis.com

and in preparing to issue a RFP, the Program Manger convened a meeting to identify research needs/data gaps. Participants in those sessions represented a wide range of disciplines that included plant pathologists, foresters, fire ecologists, state and federal regulators, private, state, and federal land managers, wildlife biologists, entomologists, modelers, and social scientists. A RFP that highlighted high priority research needs was prepared based on the results of the research needs assessment. Upon receipt of research proposals the Program Manager acquired two peer reviews for each proposal. A selection committee composed of individuals from the USDA Forest Service-Washington Office, Research and Development; USDA Forest Service – PSW; USDA Forest Service-Pacific Southwest Region, Forest Health Protection; California Department of Forestry and Fire Protection; and the University of California, Berkeley evaluated the reviews and proposals.

Four emphasis areas have been identified for purposes of organizing the PSW SOD Research Program: (1) Pathogen biology, hosts, and epidemiology; (2) Disease management, detection, and resource utilization; (3) Disease impacts on ecosystem components; and (4) Economic and social impacts (i.e. Native American issues). The first area of emphasis includes research in such areas as growth habits and attributes of the pathogen; mechanisms of survival and infection; identification of developmental characteristics; and identification of hosts, both native to California and potential hosts. The second area of emphasis is characterized by development of treatment strategies; discovery of improved diagnostics; modeling of risks; and feasibility studies for the disposal and/or utilization of biomass killed by the disease. The third area of emphasis includes research on the potential effects on wildlife, such as small mammals, birds and insects; effects on species composition of affected forests, site productivity as a result of various levels of tree mortality; and potential effects on biodiversity. Finally, the fourth emphasis area focuses on the potential effects of SOD on local, regional, national and international economies associated with forestry, horticulture and urban land values. Most importantly this fourth area also includes social impacts, especially those that could potentially impact Native American culture.

Over the course of the last five years, funding of research proposals within the various emphasis areas has been uneven. This is to be expected when conducting a research program on an entirely new organism that only recently (2000) was given a scientific name. Pathogen biology, identification of susceptible hosts and epidemiology of *P. ramorum* received about 49 percent of the available research funds between 2001 and 2005. Research that was centered on disease management, detection and resource utilization was awarded 18 percent of the available funds and potential impacts on ecosystem components received about 19 percent during the same time period. The remaining percentage was devoted to begin determining the economic and social impacts. However, it needs to be pointed out that there has been a steady shift during FY 2004 and 2005 toward funding of research that emphasized disease management, detection, diagnostics, and the social and economic impacts. In addition, whereas much of the research activity has centered on the Pacific Coast (i.e. California and Oregon), events in the last few years has seen an increase in funding to other areas of the United States and Europe.

Funded research proposals highlight the broad array of institutions that the PSW SOD Research Program utilized to forward its objectives. Twelve academic institutions are being funded and represent both public and private universities. Geographically they range from the University of California, Davis and Berkeley, to the University of West Virginia. Two private research institutions were also recipients of SOD research funds. Federal government research agencies included USDA-Agricultural Research Service, five USDA Forest Service Research Stations and two Department of Energy agencies, Joint Genome Institute and Oak Ridge National Laboratory. Finally, because of the international importance of this organism, several European research facilities and one Mexican research institute received SOD program funding.

Our knowledge and understanding of both *P. ramorum* and the disease known as SOD has advanced greatly since the inception of the PSW SOD Research Program in late 2000. Research results, funded by the SOD Program, have assisted in the formulation of important science-based regulatory programs that aim to impede the spread of this disease. Treatment strategies have been developed that can prevent infection of individual trees that impact landscape values, especially in the urban/wildland interface. Important environmental parameters have been identified that play critical roles in the spread and infection of trees in wildland settings. New diagnostics are being developed to more rapidly identify infected plant material and aid in the delineation of infected nursery plants or wildland areas. The PSW SOD Research Program should continue to serve as the key entity in future *P. ramorum* and sudden oak death research to ensure a full understanding of this organism.